DRINKING WATER SURVEILLANCE PROGRAM

# PORT STANLEY WATER TREATMENT PLANT

ANNUAL REPORT 1990

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# PORT STANLEY
# WATER TREATMENT PLANT

## DRINKING WATER SURVEILLANCE PROGRAM

## ANNUAL REPORT 1990

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# EXECUTIVE SUMMARY

## DRINKING WATER SURVEILLANCE PROGRAM

## PORT STANLEY WATER TREATMENT PLANT
## 1990 ANNUAL REPORT

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 systems were being monitored.

The Port Stanley water treatment plant is a conventional treatment plant which treats water from Lake Erie. The process consists of coagulation, flocculation, sedimentation, filtration, disinfection and fluoridation. This plant has a design capacity of 3.27 x 1000 $m^3$/day. The Port Stanley water treatment plant serves a population of approximately 2,400.

Water at the plant and at one location in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall.

Table A is a summary of all results by group.

No health related guidelines were exceeded.

The Port Stanley water treatment plant, for the sample year 1990, produced good quality water and this was maintained in the distribution system.

TABLE A

DRINKING WATER SURVEILLANCE PROGRAM PORT STANLEY WTP

SUMMARY TABLE BY SCAN

A POSITIVE VALUE DENOTES THAT THE RESULT IS GREATER THAN THE STATISTICAL LIMIT OF DETECTION AND IS QUANTIFIABLE

A '.' INDICATES THAT NO SAMPLE WAS TAKEN

| SCAN | RAW | | | TREATED | | | SITE 1 | | |
|---|---|---|---|---|---|---|---|---|---|
| | TESTS | POSITIVE | %POSITIVE | TESTS | POSITIVE | %POSITIVE | TESTS | POSITIVE | %POSITIVE |
| BACTERIOLOGICAL | 18 | 12 | 66 | 6 | 3 | 50 | 6 | 1 | 16 |
| CHEMISTRY (FLD) | 14 | 13 | 92 | 34 | 29 | 85 | 62 | 53 | 85 |
| CHEMISTRY (LAB) | 132 | 112 | 84 | 132 | 96 | 72 | 209 | 178 | 85 |
| METALS | 98 | 51 | 52 | 98 | 33 | 33 | 253 | 109 | 43 |
| CHLOROAROMATICS | 84 | 0 | 0 | 84 | 0 | 0 | 70 | 0 | 0 |
| CHLOROPHENOLS | 12 | 0 | 0 | 12 | 0 | 0 | . | . | . |
| PAH | 85 | 0 | 0 | 102 | 0 | 0 | 17 | 0 | 0 |
| PESTICIDES & PCB | 205 | 0 | 0 | 205 | 0 | 0 | 107 | 0 | 0 |
| PHENOLICS | 6 | 0 | 0 | 6 | 0 | 0 | . | . | . |
| SPECIFIC PESTICIDES | 26 | 0 | 0 | 57 | 0 | 0 | 5 | 0 | 0 |
| VOLATILES | 174 | 5 | 2 | 174 | 24 | 13 | 174 | 24 | 13 |
| TOTAL | 854 | 193 | | 910 | 185 | | 903 | 365 | |

# DRINKING WATER SURVEILLANCE PROGRAM

## PORT STANLEY WATER TREATMENT PLANT
## 1990 ANNUAL REPORT

### INTRODUCTION

The Drinking Water Surveillance Program (DWSP) for Ontario is a monitoring program providing immediate, reliable, current information on drinking water quality. The DWSP officially began in April 1986 and is designed to eventually include all municipal supplies in Ontario. In 1990, 76 systems were being monitored.

Appendix A has a full description of the DWSP.

The DWSP was initiated for the Port Stanley water treatment plant in January 1986. Previous annual reports have been published for 1986, 1987, 1988 and 1989.

### PLANT DESCRIPTION

The Port Stanley water treatment plant is a conventional treatment plant which treats water from Lake Erie. The process consists of coagulation, flocculation, sedimentation, filtration (using pressure filters), disinfection and fluoridation. This plant has a design capacity of 3.27 x 1000 $m^3$/day. The Port Stanley water treatment plant serves a population of approximately 2,400.

The sample day flows ranged from 1.1 x 1000 $m^3$/day to 1.7 x 1000 $m^3$/day.

General plant information is presented in Table 1 and a schematic of plant processes, chemical addition points and sampling locations in Figure 1.

### SAMPLING AND ANALYSES

Sample lines in the plant were flushed prior to sampling to ensure that the water obtained was indicative of its origin and not residual water standing in the sample line.

At all distribution system locations two types of samples were obtained, a standing and a free flow. The standing sample consisted of water that had been in the household plumbing and service connection for a minimum of six hours. These samples were used to make an assessment of the change in the levels of inorganic compounds and metals, due to leaching from, or deposition on, the plumbing system. The only analyses carried out on the standing

samples therefore, were General Chemistry and Metals. The free flow sample represented fresh water from the distribution main, since the sample tap was flushed for five minutes prior to sampling.

Attempts were made to capture the same block of water at each sampling point by taking the retention time into consideration. Retention time was calculated by dividing the volume of water between two sampling points by sample day flow. For example, if it was determined that retention time within the plant was five hours, then there would be a five hour interval between the raw and treated sampling. Similarly, if it was estimated that it took approximately one day for the water to travel from the plant to the distribution system site, this site would be sampled one day after the treated water from the plant.

Stringent DWSP sampling protocols were followed to ensure that all samples were taken in a uniform manner (see Appendix B).

Plant operating personnel routinely analyze parameters for process control (Table 2).

Water at the plant and at one location in the distribution system was sampled for the presence of approximately 180 parameters. Parameters were divided into the following groups: bacteriological, inorganic and physical (laboratory chemistry, field chemistry and metals), and organic (chloroaromatics, chlorophenols, pesticides and PCB, phenolics, polyaromatic hydrocarbons, specific pesticides and volatiles). Samples were analyzed for specific pesticides and chlorophenols twice a year in the spring and fall. Laboratory analyses were conducted at the Ministry of the Environment facilities in Rexdale, Ontario.

## RESULTS

Field measurements were recorded on the day of sampling and were entered onto the DWSP database as submitted by plant personnel.

Table 3 contains information on delay time between raw and treated water sampling, flow rate, and treatment chemical dosages.

Table 4 is a summary break-down of the number of water samples analyzed by parameter and by water type. The number of times that a positive or trace result was detected is also reported.

Positive denotes that the result is greater than the statistical limit of detection established by the Ministry of the Environment laboratory staff and is quantifiable. Trace (<T) denotes that the level measured is greater than the lowest value detectable by the method but lies so close to the detection limit that it cannot be confidently quantified.

Table 5 presents the results for parameters detected on at least one occasion.

Table 6 lists all parameters analyzed in the DWSP.

Associated guidelines and detection limits are also supplied on Tables 5 and 6. Parameters are listed alphabetically within each scan.

## DISCUSSION

### GENERAL

Water quality was judged by comparison with the Ontario Drinking Water Objectives publication (ODWOs). When an Ontario Drinking Water Objective (ODWO) was not available, guidelines/limits from other agencies were used. These guidelines were obtained from the Parameter Listing System database.

**IN THIS REPORT, DISCUSSION IS LIMITED TO:**

- **THE TREATED AND DISTRIBUTED WATER;**
- **ONLY THOSE PARAMETERS WITH CONCENTRATIONS ABOVE GUIDELINE VALUES; AND**
- **POSITIVE ORGANIC PARAMETERS DETECTED.**

### BACTERIOLOGICAL

Guidelines for bacteriological sampling and testing of a supply are developed to maintain a proper supervision of its bacteriological quality. Routine monitoring programs usually require that multiple samples be collected in a given system. Full interpretation of bacteriological quality cannot be made on the basis of single samples.

Standard plate count was the only bacteriological analysis conducted on the treated and distributed water. No results were above the guideline.

### INORGANIC & PHYSICAL

#### CHEMISTRY (FIELD)

Field pH did not meet the ODWO Aesthetic or Recommended Operational Guideline of 6.5-8.5 pH units in 1 of 12 treated and distributed water samples with a reported value of 6.4 pH units.

It is desirable that the temperature of drinking water be less than 15°C. The palatability of water is enhanced by its coolness. A temperature below 15°C will tend to reduce the growth of nuisance

organisms and hence minimize associated taste, colour, odour and corrosion problems. The temperature of the delivered water may increase in the distribution system due to the warming effect of the soil in late summer and fall and/or as a result of higher temperatures in the source water.

Field temperature exceeded the ODWO Maximum Desirable Concentration of 15°C in 7 of 12 treated and distributed water samples with a maximum reported value of 22.0°C.

CHEMISTRY (LAB)

The ODWOs indicate that a hardness level of between 80 and 100 mg/L as calcium carbonate for domestic waters provides an acceptable balance between corrosion and encrustation. Water supplies with a hardness greater than 200 mg/L are considered poor and would possess a tendency to form scale deposits and result in excessive soap consumption.

Hardness exceeded the ODWO Aesthetic or Recommended Operational Guideline of 80-100 mg/L in 12 of 12 treated and distributed water samples with a maximum reported value of 169.0 mg/L.

Turbidity in water is caused by the presence of suspended matter such as clay, silt, colloidal particles, plankton and other microscopic organisms. The most important potential health effect of Turbidity is its interference with disinfection in the treatment plant and the maintenance of a chlorine residual. The ODWOs Maximum Acceptable Concentration for turbidity is 1.0 Formazin Turbidity Units (FTU).

The Lab turbidity exceeded Maximum Acceptable Concentration in 1 treated water sample at 1.08 FTU but this was not confirmed by the corresponding field turbidity result which was considered more reliable.

ORGANIC

CHLOROAROMATICS

The results of the chloroaromatics scan showed that none were detected above trace levels.

CHLOROPHENOLS

The results of the chlorophenols scan showed that none were detected.

## POLYAROMATIC HYDROCARBONS (PAH)

The results of the PAH scan showed that none were detected.

## PESTICIDES & PCB

The results of the PCB scan showed that none were detected.

The results of the regular pesticide scan showed that none were detected above trace levels.

## PHENOLICS

Phenolic compounds are present in the aquatic environment as a result of natural and/or industrial processes. The ODWOs recommend, as an operational guideline, that phenolic substances in drinking water not exceed 2.0 ug/L. This limit has been set primarily to prevent undesirable taste and odours, particularly in chlorinated water. No results exceeded the guideline.

## SPECIFIC PESTICIDES

The results of the specific pesticides scan showed that none were detected.

## VOLATILES

The detection of benzene, ethylbenzene, toluene and xylenes at low, trace levels may be a laboratory artifact derived from the analytical methodology.

Trihalomethanes (THMs) are produced during the water treatment process and will always occur in chlorinated waters. THMs are comprised of chloroform, chlorodibromomethane and dichlorobromomethane; bromoform occurs occasionally. Results are reported for the individual compounds as well as for total THMs. Only total THMs results are discussed.

Elevated THMs were found in one raw water sample, probably due to poor sampling technique.

Total THMs were found at positive levels in the 12 treated and distributed water samples analyzed with a maximum level of 53.8 ug/L. This was below the ODWO Maximum Acceptable Concentration of 350 ug/L.

## CONCLUSIONS

The Port Stanley water treatment plant, for the sample year of 1990, produced good quality water and this was maintained in the distribution system.

No known health related guidelines were exceeded.

FIGURE 1

# PORT STANLEY WATER TREATMENT PLANT

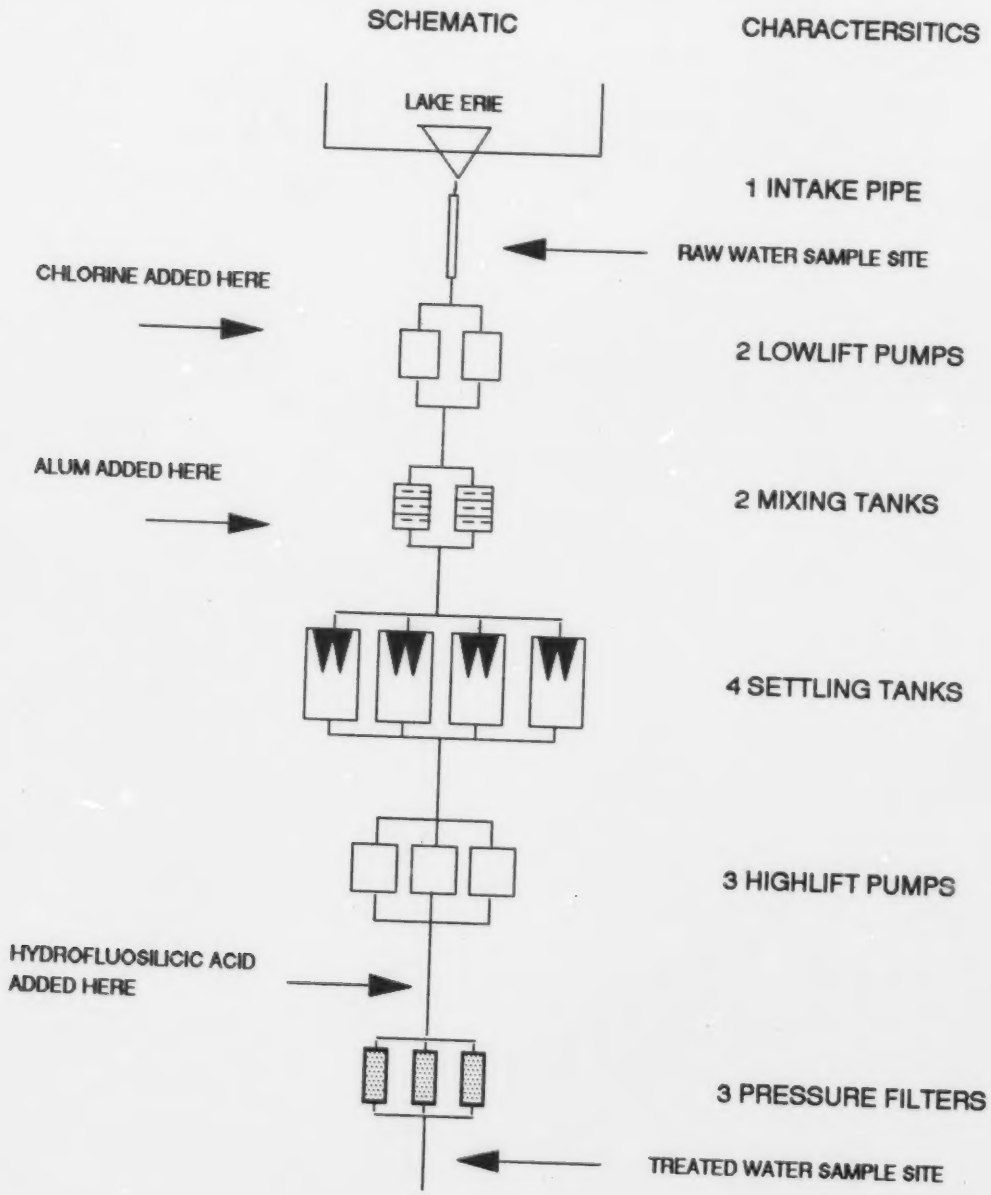

**TABLE 1**

**DRINKING WATER SURVEILLANCE PROGRAM**

**PLANT GENERAL REPORT**

| | |
|---|---|
| **WORKS #:** | 220002459 |
| **PLANT NAME:** | PORT STANLEY |
| **DISTRICT:** | LONDON |
| **REGION:** | SOUTHWEST |
| **DISTRICT OFFICER:** | MR. CHARLIE MURRAY |
| **UTM #:** | |
| **PLANT SUPERINTENDENT:** | MR. JOHN BOLT (GM) |
| **ADDRESS:** | P.O. BOX 370<br>PORT STANLEY, ONTARIO<br>N0L 2A0 |
| (Telephone) | (519 782 3381) |
| **MUNICIPALITY:** | PORT STANLEY |
| **AUTHORITY:** | MUNICIPALITY |

**PLANT INFORMATION:**

| | | |
|---|---|---|
| **PLANT VOLUME:** | .773 | **(x 1000 m3)** |
| **DESIGN CAPACITY:** | 3.273 | **(x 1000 m3/day)** |
| **RATED CAPACITY:** | 5.400 | **(x 1000 m3/day)** |

| **MUNICIPALITY:** | **POPULATION:** |
|---|---|
| PORT STANLEY | 2,000 |
| SOUTHWOULD | 36 |
| YARMOUTH TWP | 54 |

TABLE 2
DRINKING WATER SURVEILLANCE PROGRAM
IN-PLANT MONITORING

| PARAMETER | LOCATION | FREQUENCY |
|---|---|---|
| ALUMINUM | AFTER FILTERS | EVERY 2 WEEKS |
| FREE CHLORINE RESIDUAL | AFTER FILTERS | 1/2 DY |
| FLUORIDE | AFTER FILTERS | DAILY READING |
| PH | AFTER FILTERS | DAILY READING |
| TURBIDITY | AFTER FILTERS | DAILY READING |
| | RAW WATER IN LAB | DAILY READING |
| | RAW WATER | DAILY READING |

TABLE 3

DRINKING WATER SURVEILLANCE PROGRAM PORT STANLEY WTP SAMPLE DAY CONDITIONS FOR 1990

| | | | TREATMENT CHEMICAL DOSAGES (MG/L) | | |
|---|---|---|---|---|---|
| | | | PRE CHLORINATION | COAGULATION | FLUORIDATION |
| | | | CHLORINE | ALUM DRY | HYDROFLUOSILICIC ACID |
| DATE | DELAY * TIME(HRS) | FLOW (1000M3) | | | |
| JUL 03 | --- | --- | 3.00 | 10.00 | 1.51 |
| AUG 27 | 11.20 | 1.700 | 2.90 | 5.29 | 1.33 |
| SEP 25 | 12.30 | 1.388 | 8.03 | 6.48 | 2.84 |
| OCT 23 | 13.10 | 1.391 | 2.61 | 6.46 | 1.52 |
| NOV 27 | 16.00 | 1.183 | 2.69 | 7.60 | 1.43 |
| DEC 18 | 14.30 | 1.298 | 2.80 | 6.93 | 1.39 |

* THE DELAY TIME BETWEEN THE RAW AND TREATED WATER SAMPLING, SHOULD ESTIMATE THE RETENTION TIME.

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM PORT STANLEY WTP
SUMMARY TABLE OF RESULTS (1990)

| SCAN PARAMETER | RAW | | | TREATED | | | SITE 1 | | |
|---|---|---|---|---|---|---|---|---|---|
| | TOTAL | POSITIVE | TRACE | TOTAL | POSITIVE | TRACE | TOTAL | POSITIVE | TRACE |
| **BACTERIOLOGICAL** | | | | | | | | | |
| FECAL COLIFORM MF | 6 | 4 | 0 | . | . | . | . | . | . |
| STANDRD PLATE CNT MF | . | . | . | 6 | 3 | 0 | 6 | 1 | 0 |
| TOTAL COLIFORM MF | 6 | 3 | 0 | 0 | 0 | 0 | . | . | . |
| T COLIFORM BCKGRD MF | 6 | 5 | 0 | 0 | 0 | 0 | . | . | . |
| *TOTAL GROUP BACTERIOLOGICAL | 18 | 12 | 0 | 6 | 3 | 0 | 6 | 1 | 0 |
| **CHEMISTRY (FLD)** | | | | | | | | | |
| FLD CHLORINE (COMB) | . | . | . | 6 | 5 | 0 | 11 | 10 | 0 |
| FLD CHLORINE FREE | . | . | . | 6 | 6 | 0 | 11 | 11 | 0 |
| FLD CHLORINE (TOTAL) | . | . | . | 6 | 6 | 0 | 11 | 11 | 0 |
| FLD PH | 4 | 4 | 0 | 6 | 6 | 0 | 10 | 10 | 0 |
| FLD TEMPERATURE | 6 | 6 | 0 | 6 | 6 | 0 | 11 | 11 | 0 |
| FLD TURBIDITY | 4 | 3 | 0 | 4 | 0 | 0 | 8 | 0 | 0 |
| *TOTAL SCAN CHEMISTRY (FLD) | 14 | 13 | 0 | 34 | 29 | 0 | 62 | 53 | 0 |
| **CHEMISTRY (LAB)** | | | | | | | | | |
| ALKALINITY | 6 | 6 | 0 | 6 | 6 | 0 | 11 | 11 | 0 |
| CALCIUM | 6 | 6 | 0 | 6 | 6 | 0 | 11 | 11 | 0 |
| CYANIDE | 6 | 0 | 0 | 6 | 0 | 0 | . | . | . |
| CHLORIDE | 6 | 6 | 0 | 6 | 6 | 0 | 11 | 11 | 0 |
| COLOUR | 6 | 1 | 3 | 6 | 0 | 2 | 11 | 0 | 7 |
| CONDUCTIVITY | 6 | 6 | 0 | 6 | 6 | 0 | 11 | 11 | 0 |
| DISS ORG CARBON | 6 | 6 | 0 | 6 | 6 | 0 | 11 | 11 | 0 |
| FLUORIDE | 6 | 6 | 0 | 6 | 6 | 0 | 11 | 11 | 0 |
| HARDNESS | 6 | 6 | 0 | 6 | 6 | 0 | 11 | 11 | 0 |
| IONCAL | 6 | 6 | 0 | 6 | 6 | 0 | 11 | 11 | 0 |
| LANGELIERS INDEX | 6 | 6 | 0 | 6 | 6 | 0 | 11 | 11 | 0 |
| MAGNESIUM | 6 | 6 | 0 | 6 | 6 | 0 | 11 | 11 | 0 |
| SODIUM | 6 | 6 | 0 | 6 | 6 | 0 | 11 | 11 | 0 |
| AMMONIUM TOTAL | 6 | 1 | 1 | 6 | 0 | 1 | 11 | 2 | 6 |
| NITRITE | 6 | 6 | 0 | 6 | 0 | 1 | 11 | 0 | 9 |
| TOTAL NITRATES | 6 | 6 | 0 | 6 | 6 | 0 | 11 | 11 | 0 |
| NITROGEN TOT KJELD | 6 | 6 | 0 | 6 | 6 | 0 | 11 | 11 | 0 |
| PH | 6 | 6 | 0 | 6 | 6 | 0 | 11 | 11 | 0 |
| PHOSPHORUS FIL REACT | 6 | 4 | 2 | 6 | 1 | 5 | . | . | . |
| PHOSPHORUS TOTAL | 6 | 4 | 2 | 6 | 0 | 6 | . | . | . |
| SULPHATE | 6 | 6 | 0 | 6 | 6 | 0 | 11 | 11 | 0 |
| TURBIDITY | 6 | 6 | 0 | 6 | 5 | 1 | 11 | 11 | 0 |
| *TOTAL SCAN CHEMISTRY (LAB) | 132 | 112 | 8 | 132 | 96 | 16 | 209 | 178 | 22 |

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM PORT STANLEY WTP
SUMMARY TABLE OF RESULTS (1990)

| SCAN PARAMETER | RAW | | | TREATED | | | SITE 1 | | |
|---|---|---|---|---|---|---|---|---|---|
| | TOTAL | POSITIVE | TRACE | TOTAL | POSITIVE | TRACE | TOTAL | POSITIVE | TRACE |
| METALS | | | | | | | | | |
| SILVER | 4 | 0 | 0 | 4 | 0 | 0 | 11 | 0 | 0 |
| ALUMINUM | 4 | 4 | 0 | 4 | 4 | 0 | 11 | 11 | 0 |
| ARSENIC | 4 | 2 | 2 | 4 | 1 | 3 | 11 | 1 | 10 |
| BARIUM | 4 | 4 | 0 | 4 | 4 | 0 | 11 | 11 | 0 |
| BORON | 4 | 4 | 0 | 4 | 4 | 0 | 11 | 11 | 0 |
| BERYLLIUM | 4 | 0 | 2 | 4 | 0 | 0 | 11 | 0 | 1 |
| CADMIUM | 4 | 0 | 0 | 4 | 0 | 1 | 11 | 0 | 1 |
| COBALT | 4 | 0 | 4 | 4 | 0 | 4 | 11 | 0 | 11 |
| CHROMIUM | 4 | 1 | 3 | 4 | 1 | 1 | 11 | 0 | 10 |
| COPPER | 4 | 3 | 1 | 4 | 0 | 4 | 11 | 11 | 0 |
| IRON | 4 | 4 | 0 | 4 | 0 | 4 | 11 | 1 | 8 |
| MERCURY | 6 | 0 | 1 | 6 | 0 | 0 | . | . | . |
| MANGANESE | 4 | 4 | 0 | 4 | 3 | 1 | 11 | 11 | 0 |
| MOLYBDENUM | 4 | 3 | 1 | 4 | 4 | 0 | 11 | 11 | 0 |
| NICKEL | 4 | 1 | 3 | 4 | 0 | 4 | 11 | 0 | 11 |
| LEAD | 4 | 3 | 1 | 4 | 0 | 4 | 11 | 6 | 5 |
| ANTIMONY | 4 | 1 | 3 | 4 | 3 | 1 | 11 | 10 | 1 |
| SELENIUM | 4 | 0 | 1 | 4 | 0 | 2 | 11 | 0 | 5 |
| STRONTIUM | 4 | 4 | 0 | 4 | 4 | 0 | 11 | 11 | 0 |
| TITANIUM | 4 | 4 | 0 | 4 | 0 | 4 | 11 | 2 | 9 |
| THALLIUM | 4 | 0 | 0 | 4 | 0 | 0 | 11 | 0 | 0 |
| URANIUM | 4 | 1 | 3 | 4 | 1 | 3 | 11 | 1 | 10 |
| VANADIUM | 4 | 4 | 0 | 4 | 0 | 4 | 11 | 0 | 11 |
| ZINC | 4 | 4 | 0 | 4 | 4 | 0 | 11 | 11 | 0 |
| *TOTAL SCAN METALS | 98 | 51 | 25 | 98 | 33 | 40 | 253 | 109 | 93 |
| *TOTAL GROUP INORGANIC & PHYSICAL | 244 | 176 | 33 | 264 | 158 | 56 | 524 | 340 | 115 |
| CHLOROAROMATICS | | | | | | | | | |
| HEXACHLOROBUTADIENE | 6 | 0 | 0 | 6 | 0 | 0 | 5 | 0 | 0 |
| 123 TRICHLOROBENZENE | 6 | 0 | 0 | 6 | 0 | 0 | 5 | 0 | 0 |
| 1234 T-CHLOROBENZENE | 6 | 0 | 0 | 6 | 0 | 0 | 5 | 0 | 0 |
| 1235 T-CHLOROBENZENE | 6 | 0 | 0 | 6 | 0 | 0 | 5 | 0 | 0 |
| 124 TRICHLOROBENZENE | 6 | 0 | 0 | 6 | 0 | 0 | 5 | 0 | 0 |
| 1245 T-CHLOROBENZENE | 6 | 0 | 0 | 6 | 0 | 0 | 5 | 0 | 0 |
| 135 TRICHLOROBENZENE | 6 | 0 | 0 | 6 | 0 | 0 | 5 | 0 | 0 |
| HCB | 6 | 0 | 0 | 6 | 0 | 0 | 5 | 0 | 0 |
| HEXACHLOROETHANE | 6 | 0 | 0 | 6 | 0 | 0 | 5 | 0 | 1 |
| OCTACHLOROSTYRENE | 6 | 0 | 0 | 6 | 0 | 0 | 5 | 0 | 0 |
| PENTACHLOROBENZENE | 6 | 0 | 0 | 6 | 0 | 0 | 5 | 0 | 0 |
| 236 TRICHLOROTOLUENE | 6 | 0 | 0 | 6 | 0 | 0 | 5 | 0 | 0 |
| 245 TRICHLOROTOLUENE | 6 | 0 | 0 | 6 | 0 | 0 | 5 | 0 | 0 |
| 26A TRICHLOROTOLUENE | 6 | 0 | 0 | 6 | 0 | 0 | 5 | 0 | 0 |
| *TOTAL SCAN CHLOROAROMATICS | 84 | 0 | 0 | 84 | 0 | 0 | 70 | 0 | 1 |

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM PORT STANLEY WTP
SUMMARY TABLE OF RESULTS (1990)

| CHLOROPHENOLS | | RAW | | | TREATED | | | SITE 1 | |
|---|---|---|---|---|---|---|---|---|---|
| SCAN PARAMETER | TOTAL | POSITIVE | TRACE | TOTAL | POSITIVE | TRACE | TOTAL | POSITIVE | TRACE |
| 234 TRICHLOROPHENOL | 2 | 0 | 0 | 2 | 0 | 0 | . | . | . |
| 2345 T-CHLOROPHENOL | 2 | 0 | 0 | 2 | 0 | 0 | . | . | . |
| 2356 T-CHLOROPHENOL | 2 | 0 | 0 | 2 | 0 | 0 | . | . | . |
| 245-TRICHLOROPHENOL | 2 | 0 | 0 | 2 | 0 | 0 | . | . | . |
| 246-TRICHLOROPHENOL | 2 | 0 | 0 | 2 | 0 | 0 | . | . | . |
| PENTACHLOROPHENOL | 2 | 0 | 0 | 2 | 0 | 0 | . | . | . |
| *TOTAL SCAN CHLOROPHENOLS | 12 | 0 | 0 | 12 | 0 | 0 | 0 | 0 | 0 |
| PAH | | | | | | | | | |
| PHENANTHRENE | 5 | 0 | 0 | 6 | 0 | 0 | 1 | 0 | 0 |
| ANTHRACENE | 5 | 0 | 0 | 6 | 0 | 0 | 1 | 0 | 0 |
| FLUORANTHENE | 5 | 0 | 0 | 6 | 0 | 0 | 1 | 0 | 0 |
| PYRENE | 5 | 0 | 0 | 6 | 0 | 0 | 1 | 0 | 0 |
| BENZO(A)ANTHRACENE | 5 | 0 | 0 | 6 | 0 | 0 | 1 | 0 | 0 |
| CHRYSENE | 5 | 0 | 0 | 6 | 0 | 0 | 1 | 0 | 0 |
| DIMETH. BENZ(A)ANTHR | 5 | 0 | 0 | 6 | 0 | 0 | 1 | 0 | 0 |
| BENZO(E) PYRENE | 5 | 0 | 0 | 6 | 0 | 0 | 1 | 0 | 0 |
| BENZO(B) FLUORANTHEN | 5 | 0 | 0 | 6 | 0 | 0 | 1 | 0 | 0 |
| PERYLENE | 5 | 0 | 0 | 6 | 0 | 0 | 1 | 0 | 0 |
| BENZO(K) FLUORANTHEN | 5 | 0 | 0 | 6 | 0 | 0 | 1 | 0 | 0 |
| BENZO(A) PYRENE | 5 | 0 | 0 | 6 | 0 | 0 | 1 | 0 | 0 |
| BENZO(G,H,I) PERYLEN | 5 | 0 | 0 | 6 | 0 | 0 | 1 | 0 | 0 |
| DIBENZO(A,H) ANTHRAC | 5 | 0 | 0 | 6 | 0 | 0 | 1 | 0 | 0 |
| INDENO(1,2,3-C,D) PY | 5 | 0 | 0 | 6 | 0 | 0 | 1 | 0 | 0 |
| BENZO(B) CHRYSENE | 5 | 0 | 0 | 6 | 0 | 0 | 1 | 0 | 0 |
| CORONENE | 5 | 0 | 0 | 6 | 0 | 0 | 1 | 0 | 0 |
| *TOTAL SCAN PAH | 85 | 0 | 0 | 102 | 0 | 0 | 17 | 0 | 0 |
| PESTICIDES & PCB | | | | | | | | | |
| ALDRIN | 6 | 0 | 0 | 6 | 0 | 0 | 5 | 0 | 0 |
| ALPHA BHC | 6 | 0 | 2 | 6 | 0 | 4 | 5 | 0 | 2 |
| BETA BHC | 6 | 0 | 0 | 6 | 0 | 0 | 5 | 0 | 0 |
| LINDANE | 6 | 0 | 0 | 6 | 0 | 0 | 5 | 0 | 0 |
| ALPHA CHLORDANE | 6 | 0 | 0 | 6 | 0 | 0 | 5 | 0 | 0 |
| GAMMA CHLORDANE | 6 | 0 | 0 | 6 | 0 | 0 | 5 | 0 | 0 |
| DIELDRIN | 6 | 0 | 0 | 6 | 0 | 0 | 5 | 0 | 0 |
| METHOXYCHLOR | 6 | 0 | 0 | 6 | 0 | 0 | 5 | 0 | 0 |
| ENDOSULFAN 1 | 6 | 0 | 0 | 6 | 0 | 0 | 5 | 0 | 0 |
| ENDOSULFAN II | 6 | 0 | 0 | 6 | 0 | 0 | 5 | 0 | 0 |
| ENDRIN | 6 | 0 | 0 | 6 | 0 | 0 | 5 | 0 | 0 |
| ENDOSULFAN SULPHATE | 6 | 0 | 0 | 6 | 0 | 0 | 5 | 0 | 0 |
| HEPTACHLOR EPOXIDE | 6 | 0 | 0 | 6 | 0 | 0 | 5 | 0 | 0 |
| HEPTACHLOR | 6 | 0 | 0 | 6 | 0 | 0 | 5 | 0 | 0 |
| MIREX | 6 | 0 | 0 | 6 | 0 | 0 | 5 | 0 | 0 |
| OXYCHLORDANE | 6 | 0 | 0 | 6 | 0 | 0 | 5 | 0 | 0 |
| OPODT | 6 | 0 | 0 | 6 | 0 | 0 | 5 | 0 | 0 |
| PCB | 6 | 0 | 0 | 6 | 0 | 0 | 5 | 0 | 0 |
| DDD | 6 | 0 | 0 | 6 | 0 | 0 | 5 | 0 | 0 |
| PPDDE | 6 | 0 | 0 | 6 | 0 | 0 | 5 | 0 | 0 |

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM PORT STANLEY WTP
SUMMARY TABLE OF RESULTS (1990)

| SCAN PARAMETER | RAW | | | TREATED | | | SITE 1 | | |
|---|---|---|---|---|---|---|---|---|---|
| | TOTAL | POSITIVE | TRACE | TOTAL | POSITIVE | TRACE | TOTAL | POSITIVE | TRACE |
| PPDDT | 6 | 0 | 0 | 6 | 0 | 0 | 5 | 0 | 0 |
| AMETRINE | 6 | 0 | 0 | 6 | 0 | 0 | . | . | . |
| ATRAZINE | 6 | 0 | 2 | 6 | 0 | 2 | . | . | . |
| ATRATONE | 6 | 0 | 0 | 6 | 0 | 0 | . | . | . |
| CYANAZINE (BLADEX) | 6 | 0 | 0 | 6 | 0 | 0 | . | . | . |
| DESETHYLATRAZINE | 6 | 0 | 0 | 6 | 0 | 0 | . | . | . |
| D-ETHYL SIMAZINE | 5 | 0 | 0 | 5 | 0 | 0 | . | . | . |
| PROMETONE | 6 | 0 | 0 | 6 | 0 | 0 | . | . | . |
| PROPAZINE | 6 | 0 | 0 | 6 | 0 | 0 | . | . | . |
| PROMETRYNE | 6 | 0 | 0 | 6 | 0 | 0 | . | . | . |
| METRIBUZIN (SENCOR) | 5 | 0 | 0 | 5 | 0 | 0 | . | . | . |
| SIMAZINE | 6 | 0 | 0 | 6 | 0 | 0 | . | . | . |
| ALACHLOR (LASSO) | 6 | 0 | 0 | 6 | 0 | 0 | . | . | . |
| METOLACHLOR | 6 | 0 | 0 | 6 | 0 | 0 | . | . | . |
| HEXACLCYCLOPENTADIEN | 3 | 0 | 0 | 3 | 0 | 0 | 2 | 0 | 0 |
| *TOTAL SCAN PESTICIDES & PCB | 205 | 0 | 4 | 205 | 0 | 6 | 107 | 0 | 2 |
| PHENOLICS | | | | | | | | | |
| PHENOLICS | 6 | 0 | 1 | 6 | 0 | 3 | . | . | . |
| *TOTAL SCAN PHENOLICS | 6 | 0 | 1 | 6 | 0 | 3 | 0 | 0 | 0 |
| SPECIFIC PESTICIDES | | | | | | | | | |
| TOXAPHENE | 6 | 0 | 0 | 6 | 0 | 0 | 5 | 0 | 0 |
| 2,4,5-T | 2 | 0 | 0 | 2 | 0 | 0 | . | . | . |
| 2,4-D | 2 | 0 | 0 | 2 | 0 | 0 | . | . | . |
| 2,4-DB | 2 | 0 | 0 | 2 | 0 | 0 | . | . | . |
| 2,4 D PROPIONIC ACID | 2 | 0 | 0 | 2 | 0 | 0 | . | . | . |
| DICAMBA | 2 | 0 | 0 | 2 | 0 | 0 | . | . | . |
| PICHLORAM | 0 | 0 | 0 | 0 | 0 | 0 | . | . | . |
| SILVEX | 2 | 0 | 0 | 2 | 0 | 0 | . | . | . |
| DIAZINON | 0 | 0 | 0 | 2 | 0 | 0 | . | . | . |
| DICHLOROVOS | 0 | 0 | 0 | 2 | 0 | 0 | . | . | . |
| CHLORPYRIFOS | 0 | 0 | 0 | 2 | 0 | 0 | . | . | . |
| ETHION | 0 | 0 | 0 | 2 | 0 | 0 | . | . | . |
| AZINPHOS-METHYL | 0 | 0 | 0 | 0 | 0 | 0 | . | . | . |
| MALATHION | 0 | 0 | 0 | 2 | 0 | 0 | . | . | . |
| MEVINPHOS | 0 | 0 | 0 | 2 | 0 | 0 | . | . | . |
| METHYL PARATHION | 0 | 0 | 0 | 2 | 0 | 0 | . | . | . |
| METHYLTRITHION | 0 | 0 | 0 | 2 | 0 | 0 | . | . | . |
| PARATHION | 0 | 0 | 0 | 2 | 0 | 0 | . | . | . |
| PHORATE | 0 | 0 | 0 | 1 | 0 | 0 | . | . | . |
| RELDAN | 0 | 0 | 0 | 2 | 0 | 0 | . | . | . |
| RONNEL | 0 | 0 | 0 | 2 | 0 | 0 | . | . | . |
| AMINOCARB | 0 | 0 | 0 | 0 | 0 | 0 | . | . | . |
| BENONYL | 0 | 0 | 0 | 0 | 0 | 0 | . | . | . |
| BUX | 0 | 0 | 0 | 0 | 0 | 0 | . | . | . |
| CARBOFURAN | 1 | 0 | 0 | 2 | 0 | 0 | . | . | . |
| CICP | 1 | 0 | 0 | 2 | 0 | 0 | . | . | . |
| DIALLATE | 1 | 0 | 0 | 2 | 0 | 0 | . | . | . |

TABLE 4
DRINKING WATER SURVEILLANCE PROGRAM PORT STANLEY WTP
SUMMARY TABLE OF RESULTS (1990)

| SCAN PARAMETER | RAW | | | TREATED | | | SITE 1 | | |
|---|---|---|---|---|---|---|---|---|---|
| | TOTAL | POSITIVE | TRACE | TOTAL | POSITIVE | TRACE | TOTAL | POSITIVE | TRACE |
| EPTAM | 1 | 0 | 0 | 2 | 0 | 0 | . | . | . |
| IPC | 1 | 0 | 0 | 2 | 0 | 0 | . | . | . |
| PROPOXUR | 1 | 0 | 0 | 2 | 0 | 0 | . | . | . |
| CARBARYL | 1 | 0 | 0 | 2 | 0 | 0 | . | . | . |
| BUTYLATE | 1 | 0 | 0 | 2 | 0 | 0 | . | . | . |
| *TOTAL SCAN SPECIFIC PESTICIDES | 26 | 0 | 0 | 57 | 0 | 0 | 5 | 0 | 0 |
| VOLATILES | | | | | | | | | |
| BENZENE | 6 | 0 | 0 | 6 | 0 | 0 | 6 | 0 | 0 |
| TOLUENE | 6 | 0 | 1 | 6 | 0 | 5 | 6 | 0 | 3 |
| ETHYLBENZENE | 6 | 0 | 2 | 6 | 0 | 3 | 6 | 0 | 3 |
| P-XYLENE | 6 | 0 | 0 | 6 | 0 | 0 | 6 | 0 | 0 |
| M-XYLENE | 6 | 0 | 1 | 6 | 0 | 1 | 6 | 0 | 1 |
| O-XYLENE | 6 | 0 | 1 | 6 | 0 | 1 | 6 | 0 | 2 |
| STYRENE | 6 | 0 | 1 | 6 | 0 | 0 | 6 | 0 | 0 |
| 1,1 DICHLOROETHYLENE | 6 | 0 | 0 | 6 | 0 | 0 | 6 | 0 | 0 |
| METHYLENE CHLORIDE | 6 | 0 | 0 | 6 | 0 | 0 | 6 | 0 | 0 |
| T1,2DICHLOROETHYLENE | 6 | 0 | 0 | 6 | 0 | 0 | 6 | 0 | 0 |
| 1,1 DICHLOROETHANE | 6 | 0 | 0 | 6 | 0 | 0 | 6 | 0 | 0 |
| CHLOROFORM | 6 | 1 | 1 | 6 | 6 | 0 | 6 | 6 | 0 |
| 111, TRICHLOROETHANE | 6 | 0 | 0 | 6 | 0 | 1 | 6 | 0 | 0 |
| 1,2 DICHLOROETHANE | 6 | 0 | 0 | 6 | 0 | 0 | 6 | 0 | 0 |
| CARBON TETRACHLORIDE | 6 | 0 | 0 | 6 | 0 | 0 | 6 | 0 | 0 |
| 1,2 DICHLOROPROPANE | 6 | 0 | 0 | 6 | 0 | 0 | 6 | 0 | 0 |
| TRICHLOROETHYLENE | 6 | 0 | 0 | 6 | 0 | 0 | 6 | 0 | 0 |
| DICHLOROBROMOMETHANE | 6 | 2 | 0 | 6 | 6 | 0 | 6 | 6 | 0 |
| 112 TRICHLOROETHANE | 6 | 0 | 0 | 6 | 0 | 0 | 6 | 0 | 0 |
| CHLORODIBROMOMETHANE | 6 | 1 | 1 | 6 | 6 | 0 | 6 | 6 | 0 |
| T-CHLOROETHYLENE | 6 | 0 | 0 | 6 | 0 | 0 | 6 | 0 | 0 |
| BROMOFORM | 6 | 0 | 1 | 6 | 0 | 6 | 6 | 0 | 6 |
| 1122 T-CHLOROETHANE | 6 | 0 | 0 | 6 | 0 | 0 | 6 | 0 | 0 |
| CHLOROBENZENE | 6 | 0 | 0 | 6 | 0 | 0 | 6 | 0 | 0 |
| 1,4 DICHLOROBENZENE | 6 | 0 | 0 | 6 | 0 | 0 | 6 | 0 | 0 |
| 1,3 DICHLOROBENZENE | 6 | 0 | 0 | 6 | 0 | 0 | 6 | 0 | 0 |
| 1,2 DICHLOROBENZENE | 6 | 0 | 0 | 6 | 0 | 0 | 6 | 0 | 0 |
| ETHLYENE DIBROMIDE | 6 | 0 | 0 | 6 | 0 | 0 | 6 | 0 | 0 |
| TOTL TRIHALOMETHANES | 6 | 1 | 1 | 6 | 6 | 0 | 6 | 6 | 0 |
| *TOTAL SCAN VOLATILES | 174 | 5 | 10 | 174 | 24 | 17 | 174 | 24 | 15 |
| *TOTAL GROUP ORGANIC | 592 | 5 | 15 | 640 | 24 | 26 | 373 | 24 | 18 |

## KEY TO TABLE 5 and 6

A ONTARIO DRINKING WATER OBJECTIVES (ODWO)
1. Maximum Acceptable Concentration (MAC)
1+. MAC for Total Trihalomethanes
2. Interim Maximum Acceptable Concentration (IMAC)
3. Aesthetic Objective (AO)
3*. AO for Total Xylenes
4. Recommended Operational Guideline

B HEALTH & WELFARE CANADA (H&W)
1. Maximum Acceptable Concentration (MAC)
2. Proposed MAC
3. Interim MAC
4. Aesthetic Objective (AO)

C WORLD HEALTH ORGANIZATION (WHO)
1. Guideline Value (GV)
2. Tentative GV
3. Aesthetic GV

D US ENVIRONMENTAL PROTECTION AGENCY (EPA)
1. Maximum Contaminant Level (MCL)
2. Suggested No-Adverse Effect Level (SNAEL)
3. Lifetime Health Advisory
4. EPA Ambient Water Quality Criteria
4T. EPA Ambient Water Quality Criteria for Total PAH

F EUROPEAN ECONOMIC COMMUNITY (EEC)
1. Health Related Guideline Level
2. Aesthetic Guideline Level
3. Maximum Admissable Concentration (MADC)

G CALIFORNIA STATE DEPARTMENT OF HEALTH-GUIDELINE VALUE

I NEW YORK STATE AMBIENT WATER GUIDELINE

N/A NONE AVAILABLE

## LABORATORY RESULTS, REMARK DESCRIPTIONS

| | |
|---|---|
| . | No Sample Taken |
| BDL | Below Minimum Measurement Amount |
| <T | Greater Than Detection Limit But Not Confident (SEE INTERPRETATION OF RESULTS ABOVE) |
| > | Results Are Greater Than The Upper Limit |
| <=> | Approximate Result |
| !CS | No Data: Contamination Suspected |
| !IL | No Data: Sample Incorrectly Labelled |
| !IS | No Data: Insufficient Sample |
| !IV | No Data: Inverted Septum |
| !LA | No Data: Laboratory Accident |
| !LD | No Data: Test Queued After Sample Discarded |
| !NA | No Data: No Authorization To Perform Reanalysis |
| !NP | No Data: No Procedure |
| !NR | No Data: Sample Not Received |
| !OP | No Data: Obscured Plate |
| !QU | No Data: Quality Control Unacceptable |
| !PE | No Data: Procedural Error - Sample Discarded |
| !PH | No Data: Sample pH Outside Valid Range |
| !RE | No Data: Received Empty |
| !RO | No Data: See Attached Report (no numeric results) |
| !SM | No Data: Sample Missing |
| !SS | No Data: Send Separate Sample Properly Preserved |
| !UI | No Data: Indeterminant Interference |
| !TX | No Data: Time Expired |
| A3C | Approximate, Total Count Exceeded 300 Colonies |
| APL | Additional Peak, Large, Not Priority Pollutant |
| APS | Additional Peak, Less Than, Not Priority Pollutant |
| CIC | Possible Contamination, Improper Cap |
| CRO | Calculated Result Only |
| PPS | Test Performed On Preserved Sample |
| RNP | P and M-Xylene Not Separated |
| RRV | Rerun Verification |
| RVU | Reported Value Unusual |
| SPS | Several Peaks, Small, Not Priority Pollutant |

| | | |
|---|---|---|
| UCR | | Unreliable: Could Not Confirm By Reanalysis |
| UCS | | Unreliable: Contamination Suspected |
| UIN | | Unreliable: Indeterminate Interference |
| XP | | Positive After X Number Of Hours |
| T# | (T06) | Result Taken After # Hours |

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM PORT STANLEY WTP 1990

| | WATER TREATMENT PLANT | | | DISTRIBUTION SYSTEM | |
|---|---|---|---|---|---|
| | RAW | TREATED | SITE 1 | | |
| | | | STANDING | FREE FLOW | |
| BACTERIOLOGICAL | | | | | |
| FECAL COLIFORM MF (CT/100ML ) | | | DET'N LIMIT = 0 | GUIDELINE = 0 (A1) | |
| JUL | 8 | . | . | . | |
| AUG | BDL | . | . | . | |
| SEP | 16 | . | . | . | |
| OCT | BDL | . | . | . | |
| NOV | 56 | . | . | . | |
| DEC | 28 | . | . | . | |
| STANDRD PLATE CNT MF (COUNTS/ML ) | | | DET'N LIMIT = 0 | GUIDELINE = 500/ML (A3) | |
| JUL | . | 25 | . | 3 <=> | |
| AUG | . | 11 | . | 89 | |
| SEP | . | 0 <=> | . | 0 <=> | |
| OCT | . | 106 | . | 9 <=> | |
| NOV | . | 1 <=> | . | 3 <=> | |
| DEC | . | 8 <=> | . | 0 <=> | |
| TOTAL COLIFORM MF (CT/100ML ) | | | DET'N LIMIT = 0 | GUIDELINE = 5/100ML(A1) | |
| JUL | 10 <=> | !AW | . | . | |
| AUG | BDL | !AW | . | . | |
| SEP | 110 | !NN | . | . | |
| OCT | BDL | !NN | . | . | |
| NOV | 12200 | . | . | . | |
| DEC | 1300 | !AW | . | . | |
| T COLIFORM BCKGRD MF (CT/100ML ) | | | DET'N LIMIT = 0 | GUIDELINE = N/A | |
| JUL | 1200 | !AW | . | . | |
| AUG | 530 | !AW | . | . | |
| SEP | 11000 | !NN | . | . | |
| OCT | BDL | !NN | . | . | |
| NOV | 58000 | . | . | . | |
| DEC | 10000 | !AW | . | . | |

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM PORT STANLEY WTP 1990

| | WATER TREATMENT PLANT | | DISTRIBUTION SYSTEM | |
|---|---|---|---|---|
| | RAW | TREATED | SITE 1 | |
| | | | STANDING | FREE FLOW |
| CHEMISTRY (FLD) | | | | |
| FLD CHLORINE (COMB) (MG/L ) | | | DET'N LIMIT = 0 | GUIDELINE = N/A |
| JUL | . | .100 | . | .200 |
| AUG | . | .200 | .000 | .200 |
| SEP | . | .000 | .200 | .200 |
| OCT | . | .300 | .100 | .100 |
| NOV | . | .100 | .900 | .100 |
| DEC | . | .200 | .200 | .200 |
| FLD CHLORINE FREE (MG/L ) | | | DET'N LIMIT = 0 | GUIDELINE = N/A |
| JUL | . | .900 | . | .100 |
| AUG | . | 1.000 | .700 | .700 |
| SEP | . | 1.200 | 1.000 | 1.000 |
| OCT | . | 1.000 | .300 | .300 |
| NOV | . | .900 | .800 | 1.000 |
| DEC | . | 1.000 | .800 | .800 |
| FLD CHLORINE (TOTAL) ( MG/L ) | | | DET'N LIMIT = 0 | GUIDELINE = N/A |
| JUL | . | 1.000 | . | .300 |
| AUG | . | 1.200 | .700 | .900 |
| SEP | . | 1.200 | 1.200 | 1.200 |
| OCT | . | 1.300 | .400 | .400 |
| NOV | . | 1.000 | .100 | 1.100 |
| DEC | . | 1.200 | 1.000 | 1.000 |
| FLD PH (DMNSLESS ) | | | DET'N LIMIT = N/A | GUIDELINE = 6.5-8.5(A4) |
| JUL | . | 6.400 | . | 7.300 |
| AUG | 6.900 | 7.000 | 7.000 | 7.000 |
| SEP | 7.000 | 7.000 | 7.000 | 7.000 |
| OCT | . | 6.700 | . | 7.000 |
| NOV | 7.600 | 7.100 | 7.100 | 7.100 |
| DEC | 7.600 | 6.900 | 6.800 | 7.000 |
| FLD TEMPERATURE (DEG.C ) | | | DET'N LIMIT = N/A | GUIDELINE = 15 (A3) |
| JUL | 16.000 | 16.000 | . | 19.000 |
| AUG | 21.000 | 21.000 | 22.000 | 22.000 |
| SEP | 18.000 | 18.000 | 19.000 | 19.000 |
| OCT | 14.000 | 14.000 | 17.000 | 17.000 |
| NOV | 9.000 | 8.000 | 11.000 | 11.000 |
| DEC | 5.000 | 5.000 | 8.000 | 8.000 |
| FLD TURBIDITY ( FTU ) | | | DET'N LIMIT = N/A | GUIDELINE = 1 (A1) |
| AUG | . | . | .000 | .000 |
| SEP | .000 | .000 | . | . |
| OCT | 80.000 | .000 | .000 | .000 |
| NOV | 70.000 | .000 | .000 | .000 |
| DEC | 90.000 | .000 | .000 | .000 |

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM PORT STANLEY WTP 1990

| | WATER TREATMENT PLANT | | DISTRIBUTION SYSTEM | |
|---|---|---|---|---|
| | RAW | TREATED | SITE 1 | |
| | | | STANDING | FREE FLOW |
| CHEMISTRY (LAB) | | | | |
| ALKALINITY (MG/L ) | | | DET'N LIMIT = 0.2 | GUIDELINE = 30-500 (A4) |
| JUL | 100.900 | 117.400 | . | 99.800 |
| AUG | 98.000 | 93.800 | 104.700 | 99.600 |
| SEP | 96.100 | 111.200 | 109.000 | 110.300 |
| OCT | 126.700 | 114.700 | 116.700 | 113.400 |
| NOV | 105.400 | 114.300 | 112.100 | 111.900 |
| DEC | 111.200 | 112.700 | 120.400 | 117.800 |
| CALCIUM (MG/L ) | | | DET'N LIMIT = 0.2 | GUIDELINE = 100 (F2) |
| JUL | 35.800 | 48.600 | . | 40.400 |
| AUG | 35.900 | 37.700 | 44.600 | 42.100 |
| SEP | 38.800 | 47.800 | 48.200 | 48.200 |
| OCT | 51.400 | 47.700 | 48.200 | 48.000 |
| NOV | 40.600 | 48.400 | 46.700 | 47.900 |
| DEC | 41.000 | 45.800 | 49.000 | 48.000 |
| CHLORIDE (MG/L ) | | | DET'N LIMIT = 0.2 | GUIDELINE = 250 (A3) |
| JUL | 14.400 | 27.100 | . | 19.800 |
| AUG | 14.100 | 18.400 | 21.900 | 20.300 |
| SEP | 17.600 | 22.900 | 23.500 | 23.900 |
| OCT | 23.300 | 21.900 | 22.800 | 22.100 |
| NOV | 14.300 | 19.200 | 18.800 | 18.800 |
| DEC | 15.300 | 19.500 | 20.700 | 20.600 |
| COLOUR (HZU ) | | | DET'N LIMIT = 0.5 | GUIDELINE = 5 (A3) |
| JUL | 1.500 <T | .500 <T | . | 1.500 <T |
| AUG | 2.000 <T | .500 <T | 1.000 <T | .500 <T |
| SEP | 2.000 <T | BDL | .500 <T | .500 <T |
| OCT | BDL | BDL | .500 <T | BDL |
| NOV | 4.000 | BDL | BDL | BDL |
| DEC | BDL | BDL | .500 <T | BDL |
| CONDUCTIVITY (UMHO/CM ) | | | DET'N LIMIT = 1. | GUIDELINE = 400 (F2) |
| JUL | 288 | 395 | . | 324 |
| AUG | 283 | 306 | 347 | 328 |
| SEP | 281 | 365 | 366 | 371 |
| OCT | 401 | 370 | 380 | 371 |
| NOV | 287 | 357 | 351 | 350 |
| DEC | 285 | 353 | 382 | 368 |
| DISS ORG CARBON (MG/L ) | | | DET'N LIMIT = .100 | GUIDELINE = 5.0 (A3) |
| JUL | 1.800 | 1.600 | . | 1.800 |
| AUG | 2.000 | 1.800 | 2.000 | 1.800 |
| SEP | 1.900 | 1.900 | 1.900 | 1.700 |
| OCT | 2.100 | 1.800 | 2.000 | 1.700 |
| NOV | 2.100 | 2.100 | 2.000 | 1.900 |
| DEC | 2.100 | 1.800 | 2.000 | 1.700 |

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM PORT STANLEY WTP 1990

| | WATER TREATMENT PLANT | | DISTRIBUTION SYSTEM | |
|---|---|---|---|---|
| | RAW | TREATED | SITE 1 | |
| | | | STANDING | FREE FLOW |
| **FLUORIDE (MG/L )** | | | **DET'N LIMIT = 0.01** | **GUIDELINE = 2.4 (A1)** |
| JUL | .100 | 1.140 | . | 1.160 |
| AUG | .120 | 1.180 | 1.140 | 1.160 |
| SEP | .120 | 1.240 | 1.120 | 1.120 |
| OCT | .180 | 1.100 | 1.080 | 1.100 |
| NOV | .120 | 1.160 | 1.140 | 1.160 |
| DEC | .140 | 1.140 | 1.100 | 1.120 |
| **HARDNESS (MG/L )** | | | **DET'N LIMIT = 0.5** | **GUIDELINE = 80-100 (A4)** |
| JUL | 125.000 | 169.000 | . | 142.000 |
| AUG | 125.100 | 131.800 | 152.000 | 144.600 |
| SEP | 134.000 | 163.000 | 165.000 | 165.000 |
| OCT | 176.400 | 163.300 | 164.900 | 163.200 |
| NOV | 138.400 | 164.200 | 158.900 | 161.800 |
| DEC | 140.000 | 158.000 | 167.000 | 164.000 |
| **IONCAL (DMNSLESS )** | | | **DET'N LIMIT = N/A** | **GUIDELINE = N/A** |
| JUL | 1.641 | 1.064 | . | 2.064 |
| AUG | .558 | 1.448 | 3.036 | 3.861 |
| SEP | 3.465 | 3.916 | 5.746 | 4.398 |
| OCT | .054 | 2.560 | 1.684 | 3.816 |
| NOV | 4.151 | 5.491 | 4.963 | 5.776 |
| DEC | .415 | 1.154 | 1.351 | 1.066 |
| **LANGELIERS INDEX (DMNSLESS )** | | | **DET'N LIMIT = N/A** | **GUIDELINE = N/A** |
| JUL | .503 | .706 | . | .442 |
| AUG | .304 | .247 | .333 | .228 |
| SEP | .440 | .518 | .423 | .397 |
| OCT | .533 | .490 | .481 | .448 |
| NOV | .387 | .406 | .413 | .353 |
| DEC | .426 | .406 | .451 | .274 |
| **MAGNESIUM (MG/L )** | | | **DET'N LIMIT = 0.1** | **GUIDELINE = 30 (F2)** |
| JUL | 8.800 | 11.600 | . | 9.900 |
| AUG | 8.600 | 9.150 | 9.850 | 9.600 |
| SEP | 9.100 | 10.500 | 10.800 | 10.900 |
| OCT | 11.700 | 10.700 | 10.800 | 10.550 |
| NOV | 9.000 | 10.550 | 10.300 | 10.250 |
| DEC | 9.200 | 10.400 | 10.900 | 10.600 |
| **SODIUM (MG/L )** | | | **DET'N LIMIT = 0.2** | **GUIDELINE = 200 (A4)** |
| JUL | 8.400 | 14.400 | . | 10.000 |
| AUG | 8.100 | 9.200 | 11.300 | 10.400 |
| SEP | 7.600 | 11.800 | 11.800 | 12.000 |
| OCT | 12.000 | 11.300 | 11.600 | 11.700 |
| NOV | 8.600 | 10.500 | 10.600 | 10.000 |
| DEC | 8.000 | 9.800 | 10.800 | 10.600 |

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM PORT STANLEY WTP 1990

| | WATER TREATMENT PLANT | | DISTRIBUTION SYSTEM | |
|---|---|---|---|---|
| | RAW | TREATED | SITE 1 | |
| | | | STANDING | FREE FLOW |
| **AMMONIUM TOTAL (MG/L )** | | | DET'N LIMIT = 0.002 | GUIDELINE = 0.05 (F2) |
| JUL | BDL | BDL | . | BDL |
| AUG | .030 | .004 <T | .010 | .004 <T |
| SEP | BDL | BDL | .002 <T | .004 <T |
| OCT | BDL | BDL | .004 <T | .002 <T |
| NOV | .006 <T | BDL | BDL | .002 <T |
| DEC | BDL | BDL | .010 | BDL |
| **NITRITE (MG/L )** | | | DET'N LIMIT = 0.001 | GUIDELINE = 1 (A1) |
| JUL | .015 | BDL | . | .003 <T |
| AUG | .011 | BDL | .001 <T | BDL |
| SEP | .010 | BDL | .001 <T | .001 <T |
| OCT | .005 | BDL | .001 <T | .001 <T |
| NOV | .007 | .002 <T | .003 <T | .002 <T |
| DEC | .018 | BDL | .003 <T | BDL |
| **TOTAL NITRATES (MG/L )** | | | DET'N LIMIT = 0.005 | GUIDELINE = 10 (A1) |
| JUL | .270 | .340 | . | .305 |
| AUG | .255 | .255 | .290 | .250 |
| SEP | .345 | .365 | .350 | .360 |
| OCT | .350 | .310 | .320 | .310 |
| NOV | .235 | .455 | .365 | .390 |
| DEC | .265 | .325 | .380 | .330 |
| **NITROGEN TOT KJELD (MG/L )** | | | DET'N LIMIT = 0.02 | GUIDELINE = N/A |
| JUL | .220 | .160 | . | .160 |
| AUG | .230 | .130 | .190 | .140 |
| SEP | .300 | .140 | .170 | .120 |
| OCT | .170 | .150 | .210 | .160 |
| NOV | .375 | .270 | .240 | .200 |
| DEC | .350 | .140 | .230 | .200 |
| **PH (DMNSLESS )** | | | DET'N LIMIT = N/A | GUIDELINE = 6.5-8.5(A4) |
| JUL | 8.380 | 8.400 | . | 8.280 |
| AUG | 8.190 | 8.140 | 8.110 | 8.050 |
| SEP | 8.300 | 8.240 | 8.150 | 8.120 |
| OCT | 8.170 | 8.200 | 8.180 | 8.160 |
| NOV | 8.190 | 8.110 | 8.140 | 8.070 |
| DEC | 8.200 | 8.140 | 8.130 | 7.970 |
| **PHOSPHORUS FIL REACT (MG/L )** | | | DET'N LIMIT = 0.0005 | GUIDELINE = N/A |
| JUL | .001 <T | .001 <T | . | . |
| AUG | .001 <T | .001 <T | . | . |
| SEP | .005 | .001 <T | . | . |
| OCT | .017 | .003 | . | . |
| NOV | .019 | .000 <T | . | . |
| DEC | .032 | .001 <T | . | . |

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM PORT STANLEY WTP 1990

| | WATER TREATMENT PLANT | | DISTRIBUTION SYSTEM | |
|---|---|---|---|---|
| | RAW | TREATED | SITE 1 | |
| | | | STANDING | FREE FLOW |
| PHOSPHORUS TOTAL (MG/L ) | | | DET'N LIMIT = 0.002 | GUIDELINE = .40 (F2) |
| JUL | .008 <T | .003 <T | . | . |
| AUG | .007 <T | .002 <T | . | . |
| SEP | .038 | .005 <T | . | . |
| OCT | .027 | .004 <T | . | . |
| NOV | .093 | .006 <T | . | . |
| DEC | .098 | .005 <T | . | . |
| SULPHATE (MG/L ) | | | DET'N LIMIT = .200 | GUIDELINE = 500 (A3) |
| JUL | 23.010 | 39.710 | . | 29.930 |
| AUG | 22.190 | 27.780 | 33.260 | 30.610 |
| SEP | 22.630 | 34.820 | 35.210 | 36.410 |
| OCT | 39.960 | 34.830 | 35.370 | 34.620 |
| NOV | 23.440 | 32.950 | 32.140 | 32.330 |
| DEC | 23.530 | 33.630 | 35.710 | 35.050 |
| TURBIDITY (FTU ) | | | DET'N LIMIT = 0.05 | GUIDELINE = 1 (A1) |
| JUL | 2.900 | .160 <T | . | .290 |
| AUG | 2.200 | .410 | .450 | .370 |
| SEP | 29.000 | 1.080 | 1.680 | .650 |
| OCT | 26.000 | .800 | 1.400 | 1.100 |
| NOV | 108.000 | .980 | 1.500 | .880 |
| DEC | 114.000 | .930 | 1.200 | 1.200 |

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM PORT STANLEY WTP 1990

| | WATER TREATMENT PLANT | | | DISTRIBUTION SYSTEM |
|---|---|---|---|---|
| | RAW | TREATED | SITE 1 | |
| | | | STANDING | FREE FLOW |
| METALS | | | | |
| ALUMINUM (UG/L ) | | | DET'N LIMIT = 0.10 | GUIDELINE = 100 (A4) |
| JUL | . | . | . | 32.000 |
| AUG | . | . | 65.000 | 76.000 |
| SEP | 210.000 | 96.000 | 65.000 | 66.000 |
| OCT | 370.000 | 80.000 | 100.000 | 90.000 |
| NOV | 320.000 | 65.000 | 73.000 | 78.000 |
| DEC | 520.000 | 50.000 | 50.000 | 47.000 |
| ARSENIC (UG/L ) | | | DET'N LIMIT = 0.10 | GUIDELINE = 25 (A1) |
| JUL | . | . | . | .480 <T |
| AUG | . | . | .150 <T | .430 <T |
| SEP | 1.200 | .960 <T | .580 <T | .800 <T |
| OCT | .970 <T | 1.100 | 1.200 | .850 <T |
| NOV | 1.100 | .730 <T | .950 <T | .960 <T |
| DEC | .860 <T | .640 <T | .650 <T | .510 <T |
| BARIUM (UG/L ) | | | DET'N LIMIT = 0.05 | GUIDELINE = 1000 (A2) |
| JUL | . | . | . | 25.000 |
| AUG | . | . | 25.000 | 24.000 |
| SEP | 25.000 | 27.000 | 26.000 | 27.000 |
| OCT | 33.000 | 27.000 | 28.000 | 27.000 |
| NOV | 29.000 | 26.000 | 26.000 | 26.000 |
| DEC | 33.000 | 26.000 | 27.000 | 27.000 |
| BORON (UG/L ) | | | DET'N LIMIT = 2.00 | GUIDELINE = 5000 (A1) |
| JUL | . | . | . | 26.000 |
| AUG | . | . | 38.000 | 41.000 |
| SEP | 44.000 | 48.000 | 23.000 | 46.000 |
| OCT | 26.000 | 24.000 | 25.000 | 21.000 |
| NOV | 21.000 | 22.000 | 25.000 | 27.000 |
| DEC | 24.000 | 21.000 | 26.000 | 25.000 |
| BERYLLIUM (UG/L ) | | | DET'N LIMIT = 0.05 | GUIDELINE = 6800 (D4) |
| JUL | . | . | . | BDL |
| AUG | . | . | BDL | .070 <T |
| SEP | BDL | BDL | BDL | BDL |
| OCT | BDL | BDL | BDL | BDL |
| NOV | .060 <T | BDL | BDL | BDL |
| DEC | .080 <T | BDL | BDL | BDL |
| CADMIUM (UG/L ) | | | DET'N LIMIT = 0.05 | GUIDELINE = 5 (A1) |
| JUL | . | . | . | BDL |
| AUG | . | . | BDL | BDL |
| SEP | BDL | BDL | BDL | BDL |
| OCT | BDL | .060 <T | BDL | BDL |
| NOV | BDL | BDL | .060 <T | BDL |
| DEC | BDL | BDL | BDL | BDL |

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM PORT STANLEY WTP 1990

| | WATER TREATMENT PLANT | | DISTRIBUTION SYSTEM | |
|---|---|---|---|---|
| | RAW | TREATED | SITE 1 | |
| | | | STANDING | FREE FLOW |
| **COBALT ( UG/L )** | | | **DET'N LIMIT = 0.02** | **GUIDELINE = N/A** |
| JUL | . | . | . | .130 <T |
| AUG | . | . | .070 <T | .050 <T |
| SEP | .320 <T | .100 <T | .100 <T | .120 <T |
| OCT | .310 <T | .110 <T | .150 <T | .130 <T |
| NOV | .770 <T | .130 <T | .130 <T | .090 <T |
| DEC | .730 <T | .130 <T | .140 <T | .120 <T |
| **CHROMIUM (UG/L )** | | | **DET'N LIMIT = 0.50** | **GUIDELINE = 50 (A1)** |
| JUL | . | . | . | 2.200 <T |
| AUG | . | . | 2.400 <T | 2.500 <T |
| SEP | 5.500 | 5.100 | BDL | 5.000 <T |
| OCT | 1.300 <T | 1.300 <T | 1.600 <T | .880 <T |
| NOV | 1.100 <T | BDL | .720 <T | 1.400 <T |
| DEC | 2.300 <T | BDL | 1.400 <T | 1.400 <T |
| **COPPER (UG/L )** | | | **DET'N LIMIT = 0.50** | **GUIDELINE = 1000 (A3)** |
| JUL | . | . | . | 10.000 |
| AUG | . | . | 89.000 | 33.000 |
| SEP | 9.500 | 2.100 <T | 68.000 | 19.000 |
| OCT | 6.900 | 1.600 <T | 43.000 | 10.000 |
| NOV | 5.800 | 1.800 <T | 19.000 | 9.200 |
| DEC | 4.800 <T | 1.300 <T | 41.000 | 7.200 |
| **IRON (UG/L )** | | | **DET'N LIMIT = 6.00** | **GUIDELINE = 300 (A3)** |
| JUL | . | . | . | 96.000 |
| AUG | . | . | 20.000 <T | 12.000 <T |
| SEP | 390.000 | 9.200 <T | BDL | BDL |
| OCT | 440.000 | 15.000 <T | 39.000 <T | 39.000 <T |
| NOV | 830.000 | 27.000 <T | 21.000 <T | 17.000 <T |
| DEC | 1100.000 | 20.000 <T | 22.000 <T | 14.000 <T |
| **MERCURY (UG/L )** | | | **DET'N LIMIT = 0.02** | **GUIDELINE = 1 (A1)** |
| JUL | BDL | BDL | . | . |
| AUG | BDL | BDL | . | . |
| SEP | BDL | BDL | . | . |
| OCT | BDL | BDL | . | . |
| NOV | .070 <T | BDL | . | . |
| DEC | BDL | BDL | . | . |
| **MANGANESE (UG/L )** | | | **DET'N LIMIT = 0.05** | **GUIDELINE = 50 (A3)** |
| JUL | . | . | . | 9.500 |
| AUG | . | . | 1.400 | 1.800 |
| SEP | 19.000 | .870 | .920 | .800 |
| OCT | 27.000 | .480 <T | 2.000 | 1.800 |
| NOV | 61.000 | .590 | .850 | .660 |
| DEC | 44.000 | .590 | .960 | .560 |

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM PORT STANLEY WTP 1990

| | WATER TREATMENT PLANT | | DISTRIBUTION SYSTEM | |
|---|---|---|---|---|
| | RAW | TREATED | SITE 1 | |
| | | | STANDING | FREE FLOW |
| **MOLYBDENUM (UG/L )** | | | DET'N LIMIT = 0.05 | GUIDELINE = N/A |
| JUL | . | . | . | 1.000 |
| AUG | . | . | 1.400 | 1.500 |
| SEP | .900 | 1.500 | 1.600 | 1.600 |
| OCT | 1.200 | 1.500 | 1.500 | 1.500 |
| NOV | .540 | 1.400 | 1.400 | 1.400 |
| DEC | .420 <T | 1.400 | 1.300 | 1.400 |
| **NICKEL (UG/L )** | | | DET'N LIMIT = 0.20 | GUIDELINE = 350 (D3) |
| JUL | . | . | . | .590 <T |
| AUG | . | . | 1.800 <T | 1.100 <T |
| SEP | 1.100 <T | .300 <T | .850 <T | .740 <T |
| OCT | 1.400 <T | .900 <T | 1.200 <T | .880 <T |
| NOV | 2.500 | 1.300 <T | 1.900 <T | 1.400 <T |
| DEC | 1.800 <T | .830 <T | 1.400 <T | 1.500 <T |
| **LEAD (UG/L )** | | | DET'N LIMIT = 0.05 | GUIDELINE = 10. (A1) |
| JUL | . | . | . | .300 <T |
| AUG | . | . | 2.000 | .680 |
| SEP | .570 | .200 <T | 1.000 | .460 <T |
| OCT | .490 <T | .150 <T | 1.100 | .490 <T |
| NOV | 3.100 | .110 <T | .630 | .290 <T |
| DEC | 1.100 | .060 <T | .860 | .170 <T |
| **ANTIMONY (UG/L )** | | | DET'N LIMIT = 0.05 | GUIDELINE = 146 (D4) |
| JUL | . | . | . | .580 |
| AUG | . | . | .700 | .640 |
| SEP | .380 <T | .460 <T | .580 | .580 |
| OCT | .520 | .640 | .730 | .640 |
| NOV | .300 <T | .530 | .700 | .590 |
| DEC | .300 <T | .510 | .690 | .490 <T |
| **SELENIUM (UG/L )** | | | DET'N LIMIT = 1.00 | GUIDELINE = 10 (A1) |
| JUL | . | . | . | 2.000 <T |
| AUG | . | . | 2.100 <T | 1.500 <T |
| SEP | BDL | 1.900 <T | 2.100 <T | 2.300 <T |
| OCT | 1.200 <T | 1.300 <T | BDL | BDL |
| NOV | BDL | BDL | BDL | BDL |
| DEC | BDL | BDL | BDL | BDL |
| **STRONTIUM (UG/L )** | | | DET'N LIMIT = 0.10 | GUIDELINE = N/A |
| JUL | . | . | . | 170.000 |
| AUG | . | . | 200.000 | 190.000 |
| SEP | 160.000 | 200.000 | 200.000 | 210.000 |
| OCT | 220.000 | 200.000 | 210.000 | 190.000 |
| NOV | 180.000 | 200.000 | 200.000 | 200.000 |
| DEC | 170.000 | 190.000 | 200.000 | 190.000 |

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM PORT STANLEY WTP 1990

| | WATER TREATMENT PLANT | | DISTRIBUTION SYSTEM | |
|---|---|---|---|---|
| | RAW | TREATED | SITE 1 | |
| | | | STANDING | FREE FLOW |
| **TITANIUM (UG/L )** | | | **DET'N LIMIT = 0.50** | **GUIDELINE = N/A** |
| JUL | . | . | . | 6.500 |
| AUG | . | . | 5.600 | 5.000 <T |
| SEP | 8.900 | 4.800 <T | 4.600 <T | 4.300 <T |
| OCT | 9.100 | 4.600 <T | 4.900 <T | 4.300 <T |
| NOV | 10.000 | 4.800 <T | 3.800 <T | 3.900 <T |
| DEC | 12.000 | 3.500 <T | 3.800 <T | 3.700 <T |
| **URANIUM (UG/L )** | | | **DET'N LIMIT = 0.05** | **GUIDELINE = 100 (A1)** |
| JUL | . | . | . | .400 <T |
| AUG | . | . | .270 <T | .260 <T |
| SEP | .440 <T | .460 <T | .430 <T | .440 <T |
| OCT | .580 | .530 | .500 <T | .510 |
| NOV | .430 <T | .440 <T | .420 <T | .430 <T |
| DEC | .390 <T | .400 <T | .460 <T | .440 <T |
| **VANADIUM (UG/L )** | | | **DET'N LIMIT = 0.05** | **GUIDELINE = N/A** |
| JUL | . | . | . | .150 <T |
| AUG | . | . | .230 <T | .220 <T |
| SEP | .800 | .380 <T | .290 <T | .310 <T |
| OCT | .790 | .390 <T | .410 <T | .390 <T |
| NOV | 1.200 | .220 <T | .250 <T | .270 <T |
| DEC | 1.600 | .290 <T | .260 <T | .250 <T |
| **ZINC (UG/L )** | | | **DET'N LIMIT = 0.20** | **GUIDELINE = 5000 (A3)** |
| JUL | . | . | . | 3.300 |
| AUG | . | . | 24.000 | 4.300 |
| SEP | 17.000 | 2.500 | 20.000 | 3.000 |
| OCT | 20.000 | 4.200 | 18.000 | 4.000 |
| NOV | 16.000 | 5.600 | 9.600 | 4.000 |
| DEC | 15.000 | 4.400 | 25.000 | 3.000 |

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM PORT STANLEY WTP 1990

| | WATER TREATMENT PLANT | | DISTRIBUTION SYSTEM | |
|---|---|---|---|---|
| | RAW | TREATED | SITE 1 | |
| | | | STANDING | FREE FLOW |
| CHLOROAROMATICS | | | | |
| HEXACHLOROETHANE (NG/L ) | | | DET'N LIMIT = 1.000 | GUIDELINE = 1900 (D4) |
| JUL | BDL | BDL | . | BDL |
| AUG | BDL | BDL | . | BDL |
| SEP | BDL | BDL | . | BDL |
| OCT | BDL | BDL | . | !LA |
| NOV | BDL | BDL | . | 3.000 <T |
| DEC | BDL | BDL | . | BDL |

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM PORT STANLEY WTP 1990

| | WATER TREATMENT PLANT | | DISTRIBUTION SYSTEM | |
|---|---|---|---|---|
| | RAW | TREATED | SITE 1 | |
| | | | STANDING | FREE FLOW |
| PESTICIDES & PCB | | | | |
| ALPHA BHC (NG/L ) | | | DET'N LIMIT = 1.000 | GUIDELINE = 700 (G) |
| JUL | 1.000 <T | 3.000 <T | . | 1.000 <T |
| AUG | BDL | 2.000 <T | . | BDL |
| SEP | BDL | 1.000 <T | . | 1.000 <T |
| OCT | BDL | BDL | . | ILA |
| NOV | 1.000 <T | 1.000 <T | . | BDL |
| DEC | BDL | BDL | . | BDL |
| ATRAZINE (NG/L ) | | | DET'N LIMIT = 50 | GUIDELINE = 60000 (A2) |
| JUL | 180.000 <T | 150.000 <T | . | . |
| AUG | BDL | BDL | . | . |
| SEP | BDL | BDL | . | . |
| OCT | BDL | BDL | . | . |
| NOV | BDL | BDL | . | . |
| DEC | 80.000 <T | 60.000 <T | . | . |

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM PORT STANLEY WTP 1990

| | WATER TREATMENT PLANT | | DISTRIBUTION SYSTEM | | |
|---|---|---|---|---|---|
| | RAW | TREATED | SITE 1 | | |
| | | | STANDING | FREE FLOW | |
| PHENOLICS (UG/L PHENOLICS) | | | DET'N LIMIT = .200 | GUIDELINE = 2 | (A4) |
| JUL | BDL | BDL | . | . | |
| AUG | BDL | .600 <T | . | . | |
| SEP | BDL | .600 <T | . | . | |
| OCT | BDL | BDL | . | . | |
| NOV | BDL | BDL | . | . | |
| DEC | .600 <T | .600 <T | . | . | |

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM PORT STANLEY WTP 1990

| | WATER TREATMENT PLANT | | DISTRIBUTION SYSTEM | |
|---|---|---|---|---|
| | RAW | TREATED | SITE 1 | |
| | | | STANDING | FREE FLOW |
| VOLATILES | | | | |
| TOLUENE (UG/L ) | | | DET'N LIMIT = 0.05 | GUIDELINE = 24 (A3) |
| JUL | BDL | BDL | . | .100 <T |
| AUG | BDL | .050 <T | . | .050 <T |
| SEP | BDL | .100 <T | . | BDL |
| OCT | .050 <T | .100 <T | . | .050 <T |
| NOV | BDL | .100 <T | . | BDL |
| DEC | BDL | .100 <T | . | BDL |
| ETHYLBENZENE (UG/L ) | | | DET'N LIMIT = 0.05 | GUIDELINE = 2.4 (A3) |
| JUL | BDL | .050 <T | . | .050 <T |
| AUG | BDL | BDL | . | BDL |
| SEP | BDL | BDL | . | BDL |
| OCT | .050 <T | BDL | . | .050 <T |
| NOV | .050 <T | .250 <T | . | .050 <T |
| DEC | BDL | .050 <T | . | BDL |
| M-XYLENE (UG/L ) | | | DET'N LIMIT = 0.10 | GUIDELINE = 300 (A3*) |
| JUL | BDL | BDL | . | BDL |
| AUG | BDL | BDL | . | BDL |
| SEP | BDL | BDL | . | BDL |
| OCT | BDL | BDL | . | BDL |
| NOV | .200 <T | .900 <T | . | .200 <T |
| DEC | BDL | BDL | . | BDL |
| O-XYLENE (UG/L ) | | | DET'N LIMIT = 0.05 | GUIDELINE = 300 (A3*) |
| JUL | BDL | BDL | . | BDL |
| AUG | BDL | BDL | . | BDL |
| SEP | BDL | BDL | . | BDL |
| OCT | BDL | BDL | . | .050 <T |
| NOV | .100 <T | .450 <T | . | .100 <T |
| DEC | BDL | BDL | . | BDL |
| STYRENE (UG/L ) | | | DET'N LIMIT = 0.05 | GUIDELINE = 100 (D1) |
| JUL | .050 <T | BDL | . | BDL |
| AUG | BDL | BDL | . | BDL |
| SEP | BDL | BDL | . | BDL |
| OCT | BDL | BDL | . | BDL |
| NOV | BDL | BDL | . | BDL |
| DEC | BDL | BDL | . | BDL |

TABLE 5
DRINKING WATER SURVEILLANCE PROGRAM PORT STANLEY WTP 1990

| | WATER TREATMENT PLANT | | DISTRIBUTION SYSTEM | |
|---|---|---|---|---|
| | RAW | TREATED | SITE 1 | |
| | | | STANDING | FREE FLOW |
| **CHLOROFORM (UG/L )** | | | **DET'N LIMIT = 0.10** | **GUIDELINE = 350 (A1+)** |
| JUL | BDL | 15.800 | . | 18.700 |
| AUG | BDL | 28.900 | . | 30.200 |
| SEP | .900 <T | 28.500 | . | 31.100 |
| OCT | 17.000 | 25.100 | . | 24.400 |
| NOV | BDL | 23.800 | . | 26.500 |
| DEC | BDL | 16.000 | . | 19.100 |
| **111, TRICHLOROETHANE (UG/L )** | | | **DET'N LIMIT = 0.02** | **GUIDELINE = 200 (D1)** |
| JUL | BDL | .020 <T | . | BDL |
| AUG | BDL | BDL | . | BDL |
| SEP | BDL | BDL | . | BDL |
| OCT | BDL | BDL | . | BDL |
| NOV | BDL | BDL | . | BDL |
| DEC | BDL | BDL | . | BDL |
| **DICHLOROBROMOMETHANE (UG/L )** | | | **DET'N LIMIT = 0.05** | **GUIDELINE = 350 (A1+)** |
| JUL | BDL | 12.000 | . | 11.000 |
| AUG | BDL | 12.350 | . | 14.950 |
| SEP | .600 | 14.450 | . | 15.450 |
| OCT | 12.800 | 13.550 | . | 14.900 |
| NOV | BDL | 12.250 | . | 13.200 |
| DEC | BDL | 9.100 | . | 11.950 |
| **CHLORODIBROMOMETHANE (UG/L )** | | | **DET'N LIMIT = 0.10** | **GUIDELINE = 350 (A1+)** |
| JUL | BDL | 5.900 | . | 4.600 |
| AUG | BDL | 4.400 | . | 5.500 |
| SEP | .300 <T | 6.000 | . | 6.500 |
| OCT | 6.900 | 5.500 | . | 6.900 |
| NOV | BDL | 4.000 | . | 4.400 |
| DEC | BDL | 3.300 | . | 4.500 |
| **BROMOFORM (UG/L )** | | | **DET'N LIMIT = 0.20** | **GUIDELINE = 350 (A1+)** |
| JUL | BDL | .600 <T | . | .400 <T |
| AUG | BDL | .400 <T | . | .600 <T |
| SEP | BDL | .800 <T | . | .800 <T |
| OCT | 1.200 <T | .600 <T | . | 1.000 <T |
| NOV | BDL | .400 <T | . | .400 <T |
| DEC | BDL | .400 <T | . | .400 <T |
| **TOTL TRIHALOMETHANES (UG/L )** | | | **DET'N LIMIT = 0.50** | **GUIDELINE = 350 (A1)** |
| JUL | BDL | 34.300 | . | 34.700 |
| AUG | BDL | 45.900 | . | 51.150 |
| SEP | 1.800 <T | 49.650 | . | 53.850 |
| OCT | 37.900 | 44.800 | . | 47.100 |
| NOV | BDL | 40.450 | . | 44.450 |
| DEC | BDL | 28.750 | . | 36.000 |

TRACE LEVELS OF TOLUENE ARE LABORATORY ARTIFACTS DERIVED FROM THE ANALYTICAL METHODOLOGY.

TRACE LEVELS OF STYRENE ARE CONSIDERED TO BE LABORATORY ARTIFACTS RESULTING FROM THE LABORATORY SHIPPING CONTAINERS.

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

| SCAN/PARAMETER | UNIT | DETECTION LIMIT | GUIDELINE | |
|---|---|---|---|---|
| **BACTERIOLOGICAL** | | | | |
| FECAL COLIFORM MEMBRANE FILTRATION | CT/100ML | 0 | 0 | (A1) |
| STANDARD PLATE COUNT MEMBRANE FILT. | CT/ML | 0 | 500/ML | (A3) |
| TOTAL COLIFORM BACKGROUND MF | CT/100ML | 0 | N/A | |
| TOTAL COLIFORM MEMBRANE FILTRATION | CT/100ML | 0 | 5/100ML | (A1) |
| **CHEMISTRY (FLD)** | | | | |
| FIELD COMBINED CHLORINE RESIDUAL | MG/L | 0 | N/A | |
| FIELD TOTAL CHLORINE RESIDUAL | MG/L | 0 | N/A | |
| FIELD FREE CHLORINE RESIDUAL | MG/L | 0 | N/A | |
| FIELD PH | DMNSLESS | N/A | 6.5-8.5 | (A3) |
| FIELD TEMPERATURE | DEG.C | N/A | 15.0 | (A3) |
| FIELD TURBIDITY | FTU | N/A | 1.0 | (A1) |
| **CHEMISTRY (LAB)** | | | | |
| ALKALINITY | MG/L | 0.2 | 30-500 | (A3) |
| AMMONIUM TOTAL | MG/L | 0.002 | 0.05 | (F2) |
| CALCIUM | MG/L | 0.2 | 100 | (F2) |
| CHLORIDE | MG/L | 0.2 | 250 | (A3) |
| COLOUR | TCU | 0.5 | 5.0 | (A3) |
| CONDUCTIVITY | UMHO/CM | 1.0 | 400 | (F2) |
| CYANIDE | MG/L | 0.001 | 0.2 | (A1) |
| DISSOLVED ORGANIC CARBON | MG/L | 0.1 | 5.0 | (A3) |
| FLUORIDE | MG/L | 0.01 | 2.4 | (A1) |
| HARDNESS | MG/L | 0.5 | 80-100 | (A4) |
| LANGELIERS INDEX | DMNSLESS | N/A | N/A | |
| MAGNESIUM | MG/L | 0.1 | 30.0 | (F2) |
| NITRITE | MG/L | 0.001 | 1.0 | (A1) |
| NITROGEN TOTAL KJELDAHL | MG/L | 0.02 | N/A | |
| PH | DMNSLESS | N/A | 6.5-8.5 | (A4) |
| PHOSPHORUS FIL REACT | MG/L | 0.0005 | N/A | |
| PHOSPHORUS TOTAL | MG/L | 0.002 | 0.4 | (F2) |
| SODIUM | MG/L | 0.2 | 200 | (A4) |
| SULPHATE | MG/L | 0.2 | 500 | (A3) |
| TOTAL NITRATES | MG/L | 0.005 | 10.0 | (A1) |
| TURBIDITY | FTU | 0.05 | 1.0 | (A1) |
| **CHLOROAROMATICS** | | | | |
| 123 TRICHLOROBENZENE | NG/L | 5.0 | N/A | |
| 1234 TETRACHLOROBENZENE | NG/L | 1.0 | N/A | |
| 1235 TETRACHLOROBENZENE | NG/L | 1.0 | N/A | |
| 124 TRICHLOROBENZENE | NG/L | 5.0 | 10000 | (I) |
| 1245-TETRACHLOROBENZENE | NG/L | 1.0 | 38000 | (D4) |
| 135 TRICHLOROBENZENE | NG/L | 5.0 | N/A | |
| 236 TRICHLOROTOLUENE | NG/L | 5.0 | N/A | |
| 245 TRICHLOROTOLUENE | NG/L | 5.0 | N/A | |
| 26A TRICHLOROTOLUENE | NG/L | 5.0 | N/A | |
| HEXACHLOROBENZENE | NG/L | 1.0 | 10 | (C1) |
| HEXACHLOROBUTADIENE | NG/L | 1.0 | 450 | (D4) |
| HEXACHLOROCYCLOPENTADIENE | NG/L | 5.0 | 206000 | (D4) |
| HEXACHLOROETHANE | NG/L | 1.0 | 1900 | (D4) |
| OCTACHLOROSTYRENE | NG/L | 1.0 | N/A | |
| PENTACHLOROBENZENE | NG/L | 1.0 | 74000 | (D4) |
| **CHLOROPHENOLS** | | | | |
| 234 TRICHLOROPHENOL | NG/L | 100.0 | N/A | |
| 2345 TETRACHLOROPHENOL | NG/L | 20.0 | N/A | |
| 2356 TETRACHLOROPHENOL | NG/L | 10.0 | N/A | |

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

| SCAN/PARAMETER | UNIT | DETECTION LIMIT | GUIDELINE |
|---|---|---|---|
| 245 TRICHLOROPHENOL | NG/L | 100.0 | 2600000 (D4) |
| 246 TRICHLOROPHENOL | NG/L | 20.0 | 5000 (A1) |
| PENTACHLOROPHENOL | NG/L | 10.0 | 60000 (A1) |
| METALS | | | |
| ALUMINUM | UG/L | 0.10 | 100 (A4) |
| ANTIMONY | UG/L | 0.05 | 146 (D4) |
| ARSENIC | UG/L | 0.10 | 25 (A1) |
| BARIUM | UG/L | 0.05 | 1000 (A2) |
| BERYLLIUM | UG/L | 0.05 | 6800 (D4) |
| BORON | UG/L | 2.00 | 5000 (A1) |
| CADMIUM | UG/L | 0.05 | 5 (A1) |
| CHROMIUM | UG/L | 0.50 | 50 (A1) |
| COBALT | UG/L | 0.02 | N/A |
| COPPER | UG/L | 0.50 | 1000 (A3) |
| IRON | UG/L | 6.00 | 300 (A3) |
| LEAD | UG/L | 0.05 | 10 (A1) |
| MANGANESE | UG/L | 0.05 | 50 (A3) |
| MERCURY | UG/L | 0.02 | 1 (A1) |
| MOLYBDENUM | UG/L | 0.05 | N/A |
| NICKEL | UG/L | 0.20 | 350 (D3) |
| SELENIUM | UG/L | 1.00 | 10 (A1) |
| SILVER | UG/L | 0.05 | 50 (A1) |
| STRONTIUM | UG/L | 0.10 | N/A |
| THALLIUM | UG/L | 0.05 | 13 (D4) |
| TITANIUM | UG/L | 0.50 | N/A |
| URANIUM | UG/L | 0.05 | 100 (A1) |
| VANADIUM | UG/L | 0.05 | N/A |
| ZINC | UG/L | 0.20 | 5000 (A3) |
| PAH | | | |
| ANTHRACENE | NG/L | 1.0 | N/A |
| BENZO(A) ANTHRACENE | NG/L | 20.0 | N/A |
| BENZO(A) PYRENE | NG/L | 5.0 | 10.0 (A1) |
| BENZO(B) CHRYSENE | NG/L | 2.0 | N/A |
| BENZO(B) FLUORANTHENE | NG/L | 10.0 | N/A |
| BENZO(E) PYRENE | NG/L | 50.0 | N/A |
| BENZO(G,H,I) PERYLENE | NG/L | 20.0 | N/A |
| BENZO(K) FLUORANTHENE | NG/L | 1.0 | N/A |
| CHRYSENE | NG/L | 50.0 | N/A |
| CORONENE | NG/L | 10.0 | N/A |
| DIBENZO(A,H) ANTHRACENE | NG/L | 10.0 | N/A |
| DIMETHYL BENZO(A) ANTHRACENE | NG/L | 5.0 | N/A |
| FLUORANTHENE | NG/L | 20.0 | 42000.0 (D4) |
| INDENO(1,2,3-C,D) PYRENE | NG/L | 20.0 | N/A |
| PERYLENE | NG/L | 10.0 | N/A |
| PHENANTHRENE | NG/L | 10.0 | N/A |
| PYRENE | NG/L | 20.0 | N/A |
| PESTICIDES & PCB | | | |
| ALACHLOR (LASSO) | NG/L | 500.0 | 5000 (A2) |
| ALDRIN | NG/L | 1.0 | 700 (A1) |
| ALPHA HEXACHLOROCYCLOHEXANE (BHC) | NG/L | 1.0 | 700 (G) |
| ALPHA CHLORDANE | NG/L | 2.0 | 7000 (A1) |
| AMETRINE | NG/L | 50.0 | 300000 (D3) |
| ATRATONE | NG/L | 50.0 | N/A |
| ATRAZINE | NG/L | 50.0 | 60000 (A2) |
| DES ETHYL ATRAZINE | NG/L | 200.0 | 60000 (A2) |
| BETA HEXACHLOROCYCLOHEXANE (BHC) | NG/L | 1.0 | 300 (G) |
| CYANAZINE (BLADEX) | NG/L | 100.0 | 10000 (A2) |
| O,P-DDD | NG/L | 5.0 | 10 (I) |
| DIELDRIN | NG/L | 2.0 | 700 (A1) |
| ENDOSULFAN 1 (THIODAN I) | NG/L | 2.0 | 74000 (D4) |
| ENDOSULFAN 2 (THIODAN II) | NG/L | 5.0 | 74000 (D4) |

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

| SCAN/PARAMETER | UNIT | DETECTION LIMIT | GUIDELINE |
|---|---|---|---|
| ENDOSULFAN SULPHATE (THIODAN SULPHATE) | NG/L | 5.0 | N/A |
| ENDRIN | NG/L | 5.0 | 1600 (D3) |
| GAMMA CHLORDANE | NG/L | 2.0 | 7000 (A1) |
| HEPTACHLOR | NG/L | 1.0 | 3000 (A1) |
| HEPTACHLOR EPOXIDE | NG/L | 1.0 | 3000 (A1) |
| LINDANE (GAMMA BHC) | NG/L | 1.0 | 4000 (A1) |
| METHOXYCHLOR | NG/L | 5.0 | 900000 (A1) |
| METOLACHLOR | NG/L | 500.0 | 50000 (A2) |
| METRIBUZIN (SENCOR) | NG/L | 100.0 | 80000 (A1) |
| MIREX | NG/L | 5.0 | N/A |
| P,P-DDD | NG/L | 5.0 | N/A |
| O,P-DDT | NG/L | 5.0 | 30000 (A1) |
| OXYCHLORDANE | NG/L | 2.0 | N/A |
| PCB | NG/L | 20.0 | 3000 (A2) |
| PPDDE | NG/L | 1.0 | 30000 (A1) |
| PPDDT | NG/L | 5.0 | 30000 (A1) |
| PROMETONE | NG/L | 50.0 | 52500 (D3) |
| PROMETRYNE | NG/L | 50.0 | 1000 (A2) |
| PROPAZINE | NG/L | 50.0 | 700000 (D3) |
| SIMAZINE | NG/L | 50.0 | 10000 (A2) |
| D-ETHYL SIMAZINE | NG/L | 200.0 | 10000 (A2) |
| TOXAPHENE | NG/L | 500.0 | 5000 (A1) |
| PHENOLICS | | | |
| PHENOLICS (UNFILTERED REACTIVE) | UG/L | 0.2 | 2 (A4) |
| SPECIFIC PESTICIDES | | | |
| 2,4 D PROPIONIC ACID | NG/L | 100. | N/A |
| 2,4,5-TRICHLOROPHENOXY ACETIC ACID | NG/L | 50. | 280000 (A1) |
| 2,4-DICHLOROBUTYRIC ACID (2,4-D) | NG/L | 100. | 100000 (A1) |
| 24-DICHLORORPHENOXYBUTYRIC ACID (24-DB) | NG/L | 200. | 18000 (B3) |
| BUTYLATE (SUTAN) | NG/L | 2000. | 245000 (D3) |
| CARBARYL (SEVIN) | NG/L | 200. | 90000 (A1) |
| CARBOFURAN | NG/L | 2000. | 90000 (A1) |
| CHLORPYRIFOS (DURSBAN) | NG/L | 20. | N/A |
| CICP (CHLORPROPHAM) | NG/L | 2000. | 350000 (G) |
| DIALLATE | NG/L | 2000. | N/A |
| DIAZINON | NG/L | 20. | 20000 (A1) |
| DICAMBA | NG/L | 50. | 120000 (A1) |
| DICHLOROVOS | NG/L | 20. | N/A |
| EPTAM | NG/L | 2000. | N/A |
| ETHION | NG/L | 20. | 35000 (G) |
| IPC | NG/L | 2000. | N/A |
| MALATHION | NG/L | 20. | 190000 (A1) |
| METHYL PARATHION | NG/L | 50. | 7000 (B3) |
| METHYLTRITHION | NG/L | 20. | N/A |
| MEVINPHOS | NG/L | 20. | N/A |
| PARATHION | NG/L | 20. | 50000 (A1) |
| PHORATE (THIMET) | NG/L | 20. | 2000 (A2) |
| PROPOXUR (BAYGON) | NG/L | 2000. | 140000 (D3) |
| RELDAN | NG/L | 20. | N/A |
| RONNEL | NG/L | 20. | N/A |
| SILVEX (2,4,5-TP) | NG/L | 20. | 10000 (A1) |
| VOLATILES | | | |
| 1,1 DICHLOROETHANE | UG/L | 0.10 | N/A |
| 1,1 DICHLOROETHYLENE | UG/L | 0.10 | 7 (D1) |
| 1,2 DICHLOROBENZENE | UG/L | 0.05 | 200 (A1) |
| 1,2 DICHLOROETHANE | UG/L | 0.05 | 5 (A1) |

TABLE 6
DRINKING WATER SURVEILLANCE PROGRAM 1990

| SCAN/PARAMETER | UNIT | DETECTION LIMIT | GUIDELINE |
|---|---|---|---|
| 1,2 DICHLOROPROPANE | UG/L | 0.05 | 5 (D1) |
| 1,3 DICHLOROBENZENE | UG/L | 0.10 | 3750 (D3) |
| 1,4 DICHLOROBENZENE | UG/L | 0.10 | 5 (A1) |
| 111, TRICHLOROETHANE | UG/L | 0.02 | 200 (D1) |
| 112 TRICHLOROETHANE | UG/L | 0.05 | 0.6 (D4) |
| 1122 TETRACHLOROETHANE | UG/L | 0.05 | 0.17(D4) |
| BENZENE | UG/L | 0.05 | 5 (A1) |
| BROMOFORM | UG/L | 0.20 | 350 (A1+) |
| CARBON TETRACHLORIDE | UG/L | 0.20 | 5 (A1) |
| CHLOROBENZENE | UG/L | 0.10 | 1510 (D3) |
| CHLORODIBROMOMETHANE | UG/L | 0.10 | 350 (A1+) |
| CHLOROFORM | UG/L | 0.10 | 350 (A1+) |
| DICHLOROBROMOMETHANE | UG/L | 0.05 | 350 (A1+) |
| ETHLYENE DIBROMIDE | UG/L | 0.05 | 50 (D1) |
| ETHYLBENZENE | UG/L | 0.05 | 2.4 (A3) |
| M-XYLENE | UG/L | 0.10 | 300 (A3*) |
| METHYLENE CHLORIDE | UG/L | 0.50 | 50 (A1) |
| O-XYLENE | UG/L | 0.05 | 300 (A3*) |
| P-XYLENE | UG/L | 0.10 | 300 (A3*) |
| STYRENE | UG/L | 0.05 | 100 (D1) |
| TETRACHLOROETHYLENE | UG/L | 0.05 | 5 (D1) |
| TRANS 1,2 DICHLOROETHYLENE | UG/L | 0.10 | 70 (D1) |
| TOLUENE | UG/L | 0.05 | 24 (A3) |
| TOTAL TRIHALOMETHANES | UG/L | 0.50 | 350 (A1) |
| TRICHLOROETHYLENE | UG/L | 0.10 | 50 (A1) |

Appendix A

## DRINKING WATER SURVEILLANCE PROGRAM
## PROGRAM DESCRIPTION

The Drinking Water Surveillance Program (DWSP) for Ontario monitors drinking water quality at municipal water supply systems. The DWSP Database Management System provides a computerized drinking water quality information system for the supplies monitored. The objectives of the program are to provide:

- immediate, reliable, current information on drinking water quality;
- a flagging mechanism for guideline exceedance;
- a definition of contaminant levels and trends;
- a comprehensive background for remedial action;
- a framework for assessment of new contaminants; and
- an indication of treatment efficiency of plant processes.

### PROGRAM

The DWSP officially began in April 1986 and is designed to eventually include all municipal water supplies in Ontario. In 1990, 76 systems were being monitored. Water supply locations have been prioritized for surveillance based primarily on criteria such as population density, probability of contamination and geographical location.

An ongoing assessment of future monitoring requirements at each location will be made. Monitoring will continue at the initial locations at an appropriate level and further locations will be phased into the program as resources permit.

A major goal of the program is to collect valid water quality data in context with plant operational characteristics at the time of sampling. As soon as sufficient data have been accumulated and analyzed, both the frequency of sampling and the range of parameters may be adjusted accordingly.

Assessments are carried out at all locations prior to initial sampling, in order to acquire complete plant process and distribution system details and to designate (and retrofit if necessary) all sampling systems and locations. This ensures that the sampled water is a reflection of the water itself.

Samples are taken of raw (ambient water) and treated water at the treatment plant and of consumer's tap water in the distribution system. In order to determine possible effects of distribution on water quality, both standing and free flow water in old and new sections of the distribution system are sampled. Sampling is carried out by operational personnel who have been trained in applicable procedures.

Comprehensive standardized procedures and field test kits are supplied to sampling personnel. This ensures that samples are taken and handled according to standard protocols and that field testing will supply reliable data. All field and laboratory analyses are carried out using "approved documented procedures". Most laboratory analyses are carried out by the Ministry of Environment (MOE), Laboratory Services Branch. Radionuclides are analyzed by the Ministry of Labour.

DATA REPORTING MECHANISM

When the analytical results are transferred from the MOE laboratory into the DWSP system, printouts of the completed analyses are sent to the MOE District Officer, the appropriate operational staff and are also retained by the DWSP unit.

PROGRAM INPUTS AND OUTPUTS

There are four major inputs and four major outputs in the program.

Program Input - Plant and Distribution System Description

The system description includes plant specific non-analytical information acquired through a questionnaire and an initial plant visit. During the initial assessment of the plant and distribution system, questionnaire content is verified and missing information added. It is intended that all data be kept current with scheduled annual updates.

The Plant and Distribution System Description consists of the following seven components:

1. PROCESS COMPONENT INVENTORY
All physical and chemical processes to which the water is subjected, from the intake pipe to the consumers' tap (where possible), are documented. These include: process type, general description of physical structures, material types, sizes, and retention time for each process within the plant. The processes may be as simple as transmission or as complex as carbon adsorption.

2. TREATMENT CHEMICALS

Chemicals used in the treatment processes, their function, application point, supplier and brand-name are recorded. Chemical dosages applied on the day of sampling are recorded in DWSP.

3. PROCESS CONTROL MEASUREMENTS

Documentation of in-plant monitoring of process parameters (eg. turbidity, chlorine residuals, pH, aluminum residuals) including methods used, monitoring locations and frequency is contained in this section. Except for the recorded Field Data, in-plant monitoring results are not retained in DWSP but are retained by the water treatment plant personnel.

4. DESIGN FLOW AND RETENTION TIME

Hydraulic capacity, designed and actual, is noted here. Retention time (the time that a block of water is retained in the plant) is also noted. Maximum, minimum and average flow, as well as a record of the flow rate on the day of sampling, are recorded in DWSP.

5. DISTRIBUTION SYSTEM DESCRIPTION

This area includes the storage and transmission characteristics of the distribution system after the water leaves the plant.

6. SAMPLING SYSTEM

Each plant is assessed for its adequacy in terms of the sampling of bacteriological, organic and inorganic parameters. Prime considerations in the assessment and design of the sampling system are:

i/ the sample is an accurate representation of the actual water condition, eg. raw water has had no chemical treatment;

ii/ the water being sampled is not being modified by the sampling system;

iii/ the sample tap must be in a clean area of the plant, preferably a lab area; and

iv/ the sample lines must be organically inert (no plastic, ideally stainless steel).

It is imperative that the sampled water be a reflection not of the sampling system but of the water itself.

The sampling system documentation includes: origin of the water; date sampling was initiated; size, length and material type (intake,

discharge and tap); pump characteristics (model, type, capacity); and flow rate.

7. PERSONNEL
This section contains the names, addresses and phone numbers of current plant management and operational staff, distribution system management and operational staff, Medical Officer of Health and appropriate MOE personnel associated with the plant.

Program Input - Field Data

The second major input to DWSP is field data. Field data is collected at the plant and from the distribution system sites on the day of sampling. Field data consists of general operating conditions and the results of testing for field parameters. General operating conditions include chemicals used, dosages, flow and retention time on the day of sampling, as well as, monthly maximum, minimum and average flows. Field parameters include turbidity, chlorine residuals (free, combined and total), temperature and pH. These parameters are analyzed according to standardized DWSP protocols to allow for interplant comparison.

Program Input - Laboratory Analytical Data

The third major input to DWSP is Laboratory Analytical Data. Samples gathered from the raw, treated and distribution sampling sites are analyzed for the presence of approximately 180 parameters at a frequency of two to twelve times per year. Sixty-five percent of the parameters are organic. Parameters measured may have health or aesthetic implications when present in drinking water. Many of the parameters may be used in the treatment process or may be treatment by-products. Due to the nature of certain analytical instruments, parameters may be measured in a "scan" producing some results for parameters that are not on the DWSP priority list, but which may be of interest. The majority of parameters are measured on a routine basis. Those that are technically more difficult and/or costly to analyze, however, are done less frequently. These include Specific Pesticides and Chlorophenols.

Although the parameter list is extensive, additional parameters with the potential to cause health or aesthetic related problems may be added provided reliable analytical and sampling methods exist.

All laboratory generated data is derived from standardized, documented analytical protocols. The analytical method is an integral part of the data and as methods change, notation will be made and comparison data documented.

## Program Input - Parameter Reference Information

The fourth major input to DWSP is Parameter Reference Information. This is a catalogue of information for each substance analyzed on DWSP. It includes parameter name and aliases, physical and chemical properties, basic toxicology, world-wide health limits, treatment methods and uses. The Parameter Reference Information is computerized and can be accessed through the Query function of the DWSP database. An example is shown in figure 1.

## Program output - Query

All DWSP information is easily accessed through the Query function, therefore, anything from addresses of plant personnel to complete water quality information for a plant's water supply is instantly available. The DWSP computer system makes relatively complex inquiries manageable. A personal password allowing access into the DWSP query mode in all MOE offices is being developed by the DWSP group.

## Program Output - Action Alerts

Drinking Water quality in Ontario is evaluated against provincial objectives as outlined in the Ontario Drinking Water Objectives publication. Should the reported level of a substance in treated water exceed the Ontario Drinking Water Objective, an "Action Alert" requiring resampling and confirmation is issued. This assures that operational staff, health authorities and the public are notified as soon as possible of the confirmation of an exceedance and remedial action taken. This report supplies a history of the occurrence of past exceedances at the plant plus a historical summary on the parameter of concern.

In the absence of Ontario Drinking Water Objectives, guidelines/limits from other agencies are used. The Parameter Listing System, published by MOE (ISBN 0-7729-4461-X), catalogues and keeps current guidelines for 650 parameters from agencies throughout the world. If these guidelines are exceeded, the results are flagged and evaluated by DWSP personnel. An "Action Alert" will be issued if warranted.

## Program Output - Report Generation

Custom reports can be generated from DWSP to meet MOE Regional needs and to respond to public requests.

## Program Output - Annual Reports

It is the practice of DWSP to produce an annual report containing analytical data along with companion plant information.

FIG.1

MOE - DRINKING WATER ASSESSMENT PROGRAM (DWSP)

PARAMETER REFERENCE INFORMATION

**BENZENE** ( B2001P ) VOLATILES

CLASS: HEALTH METHOD: POCODO UNIT: µg/L

| SOURCE | FROM | TO | METHOD | GUIDELINE | UNIT | NOTE |
|---|---|---|---|---|---|---|
| CAL C | 85/01 | | | 0.700 | µg/L | AL |
| CDWG C | 87/01 | | | 5.000 | µg/L | MAC |
| EPA C | 87/07 | | | 5.000 | µg/L | MCL |
| EPAA C | 80/11 | | | 6.600 | µg/L | AMBIENT ** |
| FERC C | 84/05 | | | 1.000 | µg/L | MCL |
| WHO C | 84/01 | | | 10.000 | µg/L | GV |

DESCRIPTION:**NAME:** BENZENE

**CAS#:** 71-43-2

**MOLECULAR FORMULAE:** $C_6H_6$

**DETECTION LIMIT:** (FOR METHOD POCODO) 0.05 µg/L

**SYNONYMS:** BENZOL; BENZOLE; COAL NAPHTHA; CARBON OIL (27). CYCLOHEXATRIENE (41).

**CHARACTERISTICS:** COLOURLESS TO LIGHT-YELLOW, MOBILE, NON-POLAR LIQUID, OF HIGHLY REFRACTIVE NATURE, AROMATIC ODOUR; VAPOURS BURN WITH SMOKING FLAME (30).

**PROPERTIES:** SOLUBILITY IN WATER: 1780-1800 mg/L AT 25C (41). THRESHOLD ODOUR: 0.5 - 10 PPM IN WATERTHRESHOLD TASTE 0.5 mg/L IN WATER (39).
ENVIRONMENTAL FATE: MAY BIOACCUMULATE IN LIVING ORGANISMS AND APPEARS TO ACCUMULATE IN ANIMAL TISSUES THAT EXHIBIT A HIGH LIPID CONTENT OR REPRESENT MAJOR METABOLIC SITES, SUCH AS LIVER OR BRAIN; SMALL QUANTITIES EVAPORATE FROM SOILS OR ARE DEGRADED RATHER QUICKLY (80).

**SOURCES:** COMMERCIAL: PETROLEUM REFINING; SOLVENT RECOVERY; COAL TAR DISTILLATION (39); FOOD PROCESSING AND TANNING INDUSTRIES; COMBUSTION OF CAR EXHAUST.
ENVIRONMENTAL: POSSIBLE SOURCE IS RUNOFF.

**USES:** DETERGENTS; NYLON; INTERMEDIATE IN PRODUCTION OF OTHER COMPOUNDS, SUCH AS PESTICIDES; SOLVENT FOR EXTRACTION AND RECTIFICATION IN RUBBER INDUSTRY; DEGREASING AND CLEANSING AGENT; GASOLINE.

**TOXICITY:** RATING: 4 (VERY TOXIC).
ACUTE: IRRITATING TO MUCOUS MEMBRANES; SYMPTOMS INCLUDE RESTLESSNESS, CONVULSIONS, EXCITEMENT, DEPRESSION; DEATH MAY FOLLOW RESPIRATORY FAILURE.
CHRONIC: MAY CAUSE ANAEMIA AND LEUKAEMIA (45); MUTAGENIC.
MODE OF ACTION: CHROMOABERRATION IN LYMPHOCYTE CULTURES.

**CARCINOGENICITY:** A KNOWN HUMAN CARCINOGEN.

**REMOVAL:** THE FOLLOWING PROCESSES HAVE BEEN SUCCESSFUL IN REMOVING BENZENE FROM WASTEWATER: GAC ADSORPTION, PRECIPITATION WITH ALUM AND SUBSEQUENT REMOVAL VIA SEDIMENTATION, COAGULATION AND FLOCCULATION, SOLVENT EXTRACTION, OXIDATION

**ADDITIONAL PROPERTIES:**
MOLECULAR WEIGHT: 78.12
MELTING POINT: 5.5°C (27).
BOILING POINT: 80.1°C (27).
SPECIFIC GRAVITY: 0.8790 AT 20°C (27).
VAPOUR PRESSURE: 100 MM AT 26.1°C (27).
HENRY'S LAW CONSTANT: 0.00555 ATM-M3/MOLE (41).
LOG OCT./WATER PARTITION COEFFICIENT: 1.95 TO 2.13 (39).
CARBON ADSORPTION: K=1.0; 1/N=1.6; R=0.97; PH=5.3 (41)SEDIMENT/WATER PARTITION COEFFICIENT: NO DATA

**NOTES:** EPA PRIORITY POLLUTANT.

Appendix B

## DWSP SAMPLING GUIDELINE

### i) Raw and Treated at Plant

| | |
|---|---|
| General Chemistry | -500 mL plastic bottle (PET 500)<br>-rinse bottle and cap with sample water three times<br>-fill to 2 cm from top |
| Bacteriological | -220 mL plastic bottle with white seal on cap<br>-do not rinse bottle, preservative has been added<br>-avoid touching bottle neck or inside of cap<br>-fill to top of red label as marked |
| Metals | -500 mL plastic bottle (PET 500)<br>-rinse bottle and cap three times<br>-fill to 2 cm from top<br>-add 10 drops nitric acid ($HNO_3$)<br>(**Caution:** $HNO_3$ is corrosive) |
| Volatiles (duplicates) (OPOPUP) | -45 mL glass vial with septum (teflon side must be in contact with sample)<br>-do not rinse bottle<br>-fill bottle completely without bubbles |
| Organics (OWOC),(OWTRI),(OAPAHX) | -1 L amber glass bottle per scan<br>-do not rinse bottle<br>-fill to 2 cm from top<br>-when 'special pesticides' are requested three extra bottles must be filled |
| Cyanide | -500 mL plastic bottle (PET 500)<br>-rinse bottle and cap three times<br>-fill to 2 cm from top |

| | |
|---|---|
| | -*add 10 drops sodium hydroxide (NaOH)*<br>(**Caution:** NaOH is corrosive) |
| Mercury | -250 mL glass bottle<br>-rinse bottle and cap three times<br>-fill to top of label<br>-add 20 drops each nitric acid ($HNO_3$) and potassium dichromate ($K_2Cr_2O_7$)<br>(**Caution:** $HNO_3$&$K_2Cr_2O_7$ are corrosive) |
| Phenols | -250 mL glass bottle<br>-do <u>not</u> rinse bottle, preservative has been added<br>-fill to top of label |
| Radionuclides<br>(as scheduled) | -4 L plastic jug<br>-do <u>not</u> rinse, carrier added<br>-fill to 5 cm from top |
| Organic Characterization<br>(GC/MS - once per year) | -1 L amber glass bottle; instructions as per organic<br>-250 mL glass bottle<br>-do <u>not</u> rinse bottle<br>-fill completely without bubbles |

<u>Steps:</u>

1. Let sampling water tap run for an adequate time to clear the sample line.
2. Record time of day on submission sheet.
3. Record temperature on submission sheet.
4. Fill up all bottles as per instructions.
5. Record chlorine residuals (free, combined and total for treated water only), turbidity and pH on submission sheet.

**ii) Distribution Samples (standing water)**

| | |
|---|---|
| General Chemistry | -500 mL plastic bottle (PET 500)<br>-rinse bottle and cap with sample |

| | |
|---|---|
| | water three times<br>-fill to 2 cm from top |
| Metals | -500 mL plastic bottle (PET 500)<br>-rinse bottle and cap three times<br>-fill to 2 cm from top<br>-add 10 drops nitric acid ($HNO_3$)<br>(**Caution:** $HNO_3$ is corrosive) |

Steps:

1. Record time of day on submission sheet.
2. Place bucket under tap and open cold water.
3. Fill to predetermined volume.
4. After mixing the water, record the temperature on the submission sheet.
5. Fill general chemistry and metals bottles.
6. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.

**iii) Distribution Samples (free flow)**

| | |
|---|---|
| General Chemistry | -500 mL plastic bottle (PET 500)<br>-rinse bottle and cap with sample water three times<br>-fill to 2 cm from top |
| Bacteriological | -250 mL plastic bottle with white seal on cap<br>-do <u>not</u> rinse bottle, preservative has been added<br>-avoid touching bottle neck or inside of cap<br>-fill to top of red label as marked |
| Metals | -500 mL plastic bottle (PET 500)<br>-rinse bottle and cap three times<br>-fill to 2 cm from top |

| | |
|---|---|
| | -add 10 drops nitric acid $HNO_3$ (**Caution:** $HNO_3$ is corrosive) |
| Volatiles (duplicate) (OPOPUP) | -45 mL glass vial with septum (teflon side must be in contact with sample)<br>-do <u>not</u> rinse bottle, preservative has been added<br>-fill bottle completely without bubbles |
| Organics (OWOC) (OAPAHX) | -1 L amber glass bottle per scan<br>-do <u>not</u> rinse bottle<br>-fill to 2 cm from top |

<u>Steps:</u>

1. Record time of day on submission sheet.

2. Let cold water flow for five minutes.

3. Record temperature on submission sheet.

4. Fill all bottles as per instructions.

5. Record chlorine residuals (free, combined and total), turbidity and pH on submission sheet.